



December 20, 2019

Mr. Peter Stevenson/Regional Response Team (RRT)
U.S. EPA Region 8
1595 Wynkoop Street
Denver, Colorado 80202

Subject: **Groundwater Monitoring Report – 2019 Annual Event**
JC Hunt – Wolf Creek Pass Spill
US Highway 160 Milepost 179.5
Apex Project No. 4910

Dear Mr. Stevenson:

On behalf of JC Hunt Company, Inc., Apex Companies, LLC (Apex) is providing you with this groundwater monitoring report for work performed recently at the above-referenced location (Figure 1). This report provides: (1) information on the environmental setting; (2) a summary of the site background; (3) a discussion of site lithology and hydrogeology; (4) a summary of the nature and extent of hydrocarbons; (5) a summary of site remediation activities; (6) a summary of groundwater monitoring performed in August 2019; and (7) a summary of remediation system decommissioning.

Environmental Setting

A gasoline tanker truck spill occurred at the west side of mile marker 179.5 on US Highway 160, approximately 12 miles northeast of Wolf Creek Pass and 7 miles southwest of South Fork, Colorado, in November 2009. The spill occurred at an elevation of approximately 8,500 feet above sea level. The terrain in the area is mountainous and rocky, with vertical cliffs immediately west of the highway, and a steep rip-rap slope dropping approximately 15 to 20 feet in ground surface level, just east of the highway. A wetlands area with shrubs, grasses, and small trees is present below and to the east of the highway and borders a stream to the east (South Fork of the Rio Grande River). The area receives heavy snowfall during the winter and early spring months, making site work difficult during that time of year.

Site Background

Release Summary and Emergency Response

The gasoline tanker truck spill resulted in the release of approximately 3,800 gallons of gasoline to the subsurface adjacent to US Highway 160 in November 2009. As a result, a dissolved gasoline hydrocarbon plume formed under the highway, and to the east of the spill location. Total fluids recovery (TFR) was initiated soon after the spill to recover both mobile non-aqueous phase liquid (NAPL) and groundwater with dissolved hydrocarbons, and many TFR events have been

conducted since then. An interceptor trench was installed in the wetlands area to prevent NAPL migration to the adjacent South Fork of the Rio Grande River and to assist with recovery via TFR. No mobile NAPL has been observed at any monitoring locations since the spring of 2010. Source area soil along the northwest side of the highway was excavated to a depth of approximately two feet, disposed of offsite, and the excavation area was backfilled with clean soil.

Well Installation and Soil Sampling

Monitoring wells MW-1, MW-2, MW-3, MW-4, and MW-5 were installed using overburden drilling excentric (ODEX) methods along the right-of-way of US Highway 160 between November 2009 and July 2012. Initial wetlands area monitoring wells were installed relatively shallow, and due to the difficulty with drill rig access at the time, were constructed using hand augering or digging with a mini-excavator (wells T-1 through T-9 and RW-1 through RW-3). Wells were completed using polyvinyl chloride (PVC) well casings and native backfill. Regular groundwater water sampling has occurred at this site since the latter part of 2009 (Table 1). Surface water sampling began in 2009 but was discontinued in August 2016, per U.S. Environmental Protection Agency (EPA) approval, as dissolved benzene concentrations in samples collected from all surface water locations had been below laboratory detection limits since November 2010.

Apex oversaw the installation of three additional monitoring wells to further define subsurface impacts in the wetlands area (MW-6, MW-7, and MW-8), and six oxygen biosparge pilot test wells (OX-1, OX-2, MP-1A/B, and MP-2A/B) in June and July 2012. Pilot test wells were placed within proximity of existing groundwater monitoring wells and areas where dissolved petroleum hydrocarbon impacts appeared to be highest within the wetlands. Apex installed the monitoring and pilot test wells with either ODEX or hollow stem auger (HSA) technology to ensure high-quality completions. Monitoring well constructions in the wetlands include stick-up casings and steel outer protective covers, allowing ease in access and sampling of the wells. Soil lithology within the wetlands area consists primarily of alluvial deposits: silty, sandy gravel with cobbles and a high clay content.

Soil sampling at selected locations was conducted to further define subsurface hydrocarbon impacts in the wetlands in November 2012. Sample locations included excavation pits and selected drainage channels, as well as locations along the bottom of the northern transect of the interceptor trench. Soil screening and sampling targeted the soil/groundwater interface for potential hydrocarbon impacts at depths of approximately 3 to 5 feet below grade. Soil was typically sampled a few inches to a foot below, or adjacent to, exposed soil at pit or trench bottoms. The soil screening and sampling data in the wetlands suggested that only relatively low levels of hydrocarbons were present in soil near the soil/groundwater interface within the extent of the dissolved hydrocarbon plume. Soil sample results are presented in Figure 2. The complete set of historical soil sampling data is included in the Soil Sampling Activities report, dated December 21, 2012.

Chemical Oxidation Infiltration Events

Apex performed two chemical oxidation infiltration events along the westbound right-of-way of US Highway 160 (the source area). Apex infiltrated 5,000-gallons and 6,500-gallons of a 12 percent hydrogen peroxide solution stabilized with sodium phytate in September and November of 2012, respectively. Analytical results from groundwater sampling after the infiltration work showed some benzene and hydrocarbon reductions, particularly at wells nearest to the infiltration area. Samples collected from wells in the wetlands did not show any significant changes in dissolved hydrocarbon concentrations, and it is likely the wells were beyond the range of influence of the infiltration events. Overall, the reduction in dissolved benzene concentrations in samples collected from some roadside monitoring wells before and after the infiltration events suggested a region of remedial influence that extended under the highway, and just into the upgradient portion of the wetlands.

Site Restoration

In May 2013, all pits, holes, and trenches previously excavated were backfilled and compacted to begin restoring the site to natural conditions, maximize the effectiveness of the planned remediation system, and allow proper system operation. Following removal of the plastic liner along the interceptor trench sidewall, the interceptor trench and the 3-foot diameter recovery holes in the treatment area were abandoned and filled. Most of the native vegetation has recovered throughout the wetlands area since then.

Lithology and Hydrogeology

Subsurface soil in the vicinity of the spill location (along US Highway 160) have been characterized as tuff bedrock, a very hard and competent bedrock composed of volcanic ash deposits. Cliffs composed of tuff bedrock are visible immediately to the west of the highway and spill location. A substantial amount of riprap and other fill materials are present under the highway to provide structural support for the roadway. Alluvial materials (clayey sands, silts, gravels, and cobbles) are present in shallow, wetland area soil, underlain by bedrock. Though hydraulic conductivity testing has not been conducted at the site, it is likely that conductivities and groundwater velocities are relatively low, based on apparent hydrogeology and the high percentage of clayey fines encountered during drilling and sampling in the wetlands. Recharge of the deeper pilot test wells (OX-1, OX-2, MP-1B, and MP-2B) during well development was relatively slow, and some pilot test wells (OX-1 and MP-1B) were still not fully recovered one month after installation. Cross-sections showing soil types through the area of investigation are presented in Figures 3 and 4.

Nature and Extent of Hydrocarbon Impacts

Gasoline has impacted soil and groundwater and resulted in a dissolved-phase plume that extends into the wetlands east of the highway. Based on recent sampling results, benzene and other petroleum hydrocarbons are present near the source area by the highway, though

hydrocarbon concentrations are much lower in samples collected from the wetland area wells (Table 1). Hydrocarbon concentrations in samples collected from most wells decreased substantially in the first few months after the spill due to TFR and natural attenuation, and reductions have been accelerated by chemical oxidation infiltrations and operation of a full-scale bioremediation system. The result of these efforts is that the hydrocarbon plume has attenuated substantially in size and concentration, and many previously impacted wells now have relatively low to non-detectable levels of hydrocarbons in groundwater samples.

Remediation System Summary

Apex operated a full-scale oxygen biosparge system between August 8, 2013 and November 26, 2014 (Figure 1). The system was comprised of 20 oxygen injection/biosparge wells screened at depths of approximately 12 to 15 feet below ground surface. Each biosparge well was connected to system control equipment via tubing housed in aboveground PVC conduit. Individual biosparge well flow rates operated at approximately 2.5 to 5 standard cubic feet per hour (scfh) of oxygen, and biosparge pressures ranged from approximately 2 to 5 pounds per square inch (psi). Cleanup goals were largely attained by the fourth quarter (Q4) 2014, and the system was shut down on November 26, 2014 to evaluate potential rebound and readiness for post-operation monitoring.

Dissolved oxygen (DO) and oxidation-reduction potential (ORP) concentrations remained elevated in wetland area monitoring wells in the spring of 2015, in spite of the bioremediation system being off for over 5 months. The elevated DO levels were likely due to low rates of oxygen consumption related to very low concentrations of dissolved hydrocarbons remaining in the wetlands, combined with naturally high background DO (typically in the range of 6 to 8 mg/L). Elevated DO will continue to promote biodegradation of remaining dissolved hydrocarbons over time.

The remediation system was restarted on May 5, 2015 at the request of the EPA. The biosparging system ran continuously throughout the remainder of the second quarter and into the fourth quarter of 2015. Per EPA approval, the system was permanently shut off on November 18, 2015.

At the direction of the EPA, Apex initiated bi-weekly sampling of the wetlands area monitoring wells (MW-6, MW-7, and T-2) on May 4, 2016. The purpose of the bi-weekly sampling was to closely monitor wetland area groundwater conditions and evaluate the need for further active remediation. Dissolved benzene concentrations in samples collected from wells MW-6, MW-7, and T-2 remained below or only slightly above clean-up goals through Q4 2016. Bi-weekly sampling was discontinued in October 2016, per EPA approval.

After EPA approval, Apex decommissioned the oxygen biosparge remediation system between August 22 and 23, 2018. Apex removed the system manifold cabinet, including the solar photovoltaic panel, along with approximately 1,000 feet of 2-inch, schedule 40 PVC conduit and oxygen supply tubing. Additionally, Apex abandoned 18 oxygen biosparge remediation wells (OX-1, OX-2, and OX-5 through OX-20) per Colorado Division of Water Resources (DWR) protocol

and removed all respective flush-mount well boxes. Biosparge wells OX-3 and OX-4 (previously MP-1B and MP-2B) were left in-place for future groundwater sampling, as needed.

Groundwater Monitoring –2019 Annual Event

Apex performed the 2019 annual sampling event on August 28, 2019. Groundwater samples were collected from one site monitoring well, MW-1. The groundwater samples were analyzed for dissolved benzene, toluene, ethylbenzene, total xylenes (BTEX), and total volatile petroleum hydrocarbons (TVPH).

The dissolved benzene concentration in the sample collected from well MW-1 (historically the most impacted well) decreased relative to the August 2018 sampling event, from 127 µg/L to 76.6 µg/L, but still remains higher than concentrations observed during sampling conducted in the second half of 2017 and the first half of 2018. Dissolved benzene concentrations in samples from MW-1 remain above the Colorado Department of Public health and Environment (CDPHE) clean-up goal of 5 µg/L. However, sample results for the roadside well continue to show an overall decreasing trend in hydrocarbon concentrations since sampling began in 2012. Additionally, the dissolved benzene concentration in the samples collected from well MW-1 have historically been inversely proportional to groundwater elevation. The groundwater elevation in monitoring well MW-1 increased by approximately 1.2 feet in August 2019, relative to the last sampling event in August 2018. Depth to groundwater remains within the historically observed range of 18 and 22 feet below top-of-casing. Groundwater sample results are presented on Figure 5. Laboratory correspondence is attached.

Summary and Recommendations for Future Work

Historical groundwater sampling results suggest steady declines in dissolved hydrocarbons at all site wells due to bioremediation in the wetlands, chemical oxidation work in the source area, and ongoing natural attenuation. Elevated dissolved oxygen concentrations historically observed in nearly all roadside and wetlands area monitoring wells will continue to promote biodegradation of remaining petroleum hydrocarbons over time. Dissolved benzene concentrations show an overall decreasing trend, and the remediation system achieved cleanup of the wetlands to the maximum extent practicable.

As previously stated, the oxygen biosparge remediation system was decommissioned in August 2018, as dissolved benzene concentrations in samples collected from wetland area monitoring wells continued to demonstrate decreasing trends. Apex performed the second annual groundwater sampling event of monitoring well MW-1 in August 2019, and dissolved benzene concentration remain above the CDPHE clean-up goal of 5 µg/L. Per direction of the EPA, the next sampling event will take place in August 2020, and will continue until groundwater goals have been reached at well MW-1. Following the attainment of clean-up goals at well MW-1, a final sampling event of monitoring wells MP-1A, MP-2A, MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, and T-2 will be performed to confirm site-wide clean-up goals have been met.

If you have any questions or need any other information pertaining to this project, please call me at (303) 242-8753.

Sincerely,

Apex Companies, LLC



Jason Grubb, P.G.
Assistant Project Manager

Reviewed by:



Kyle McGarry,
Project Manager

Approved by:

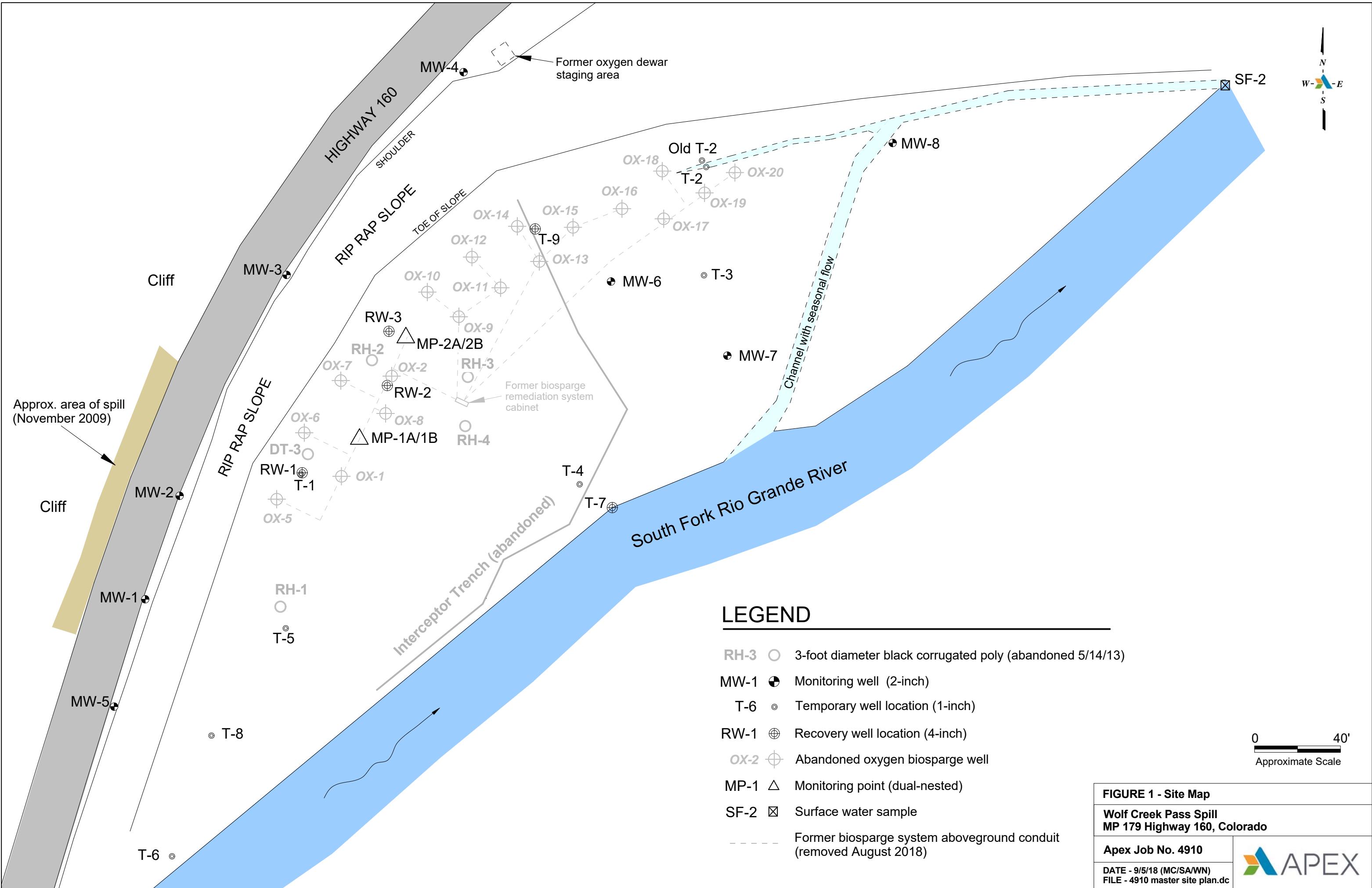


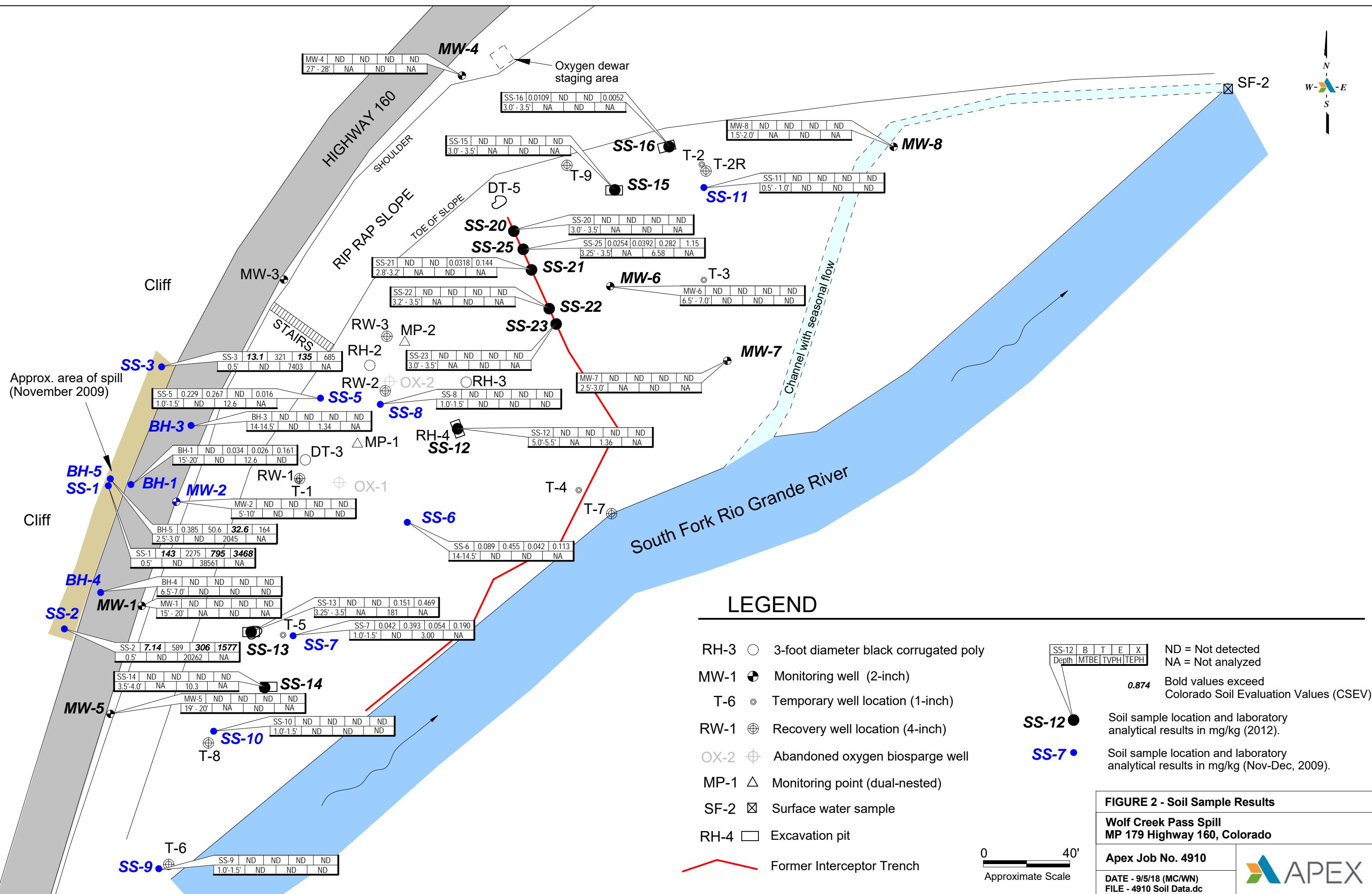
K. Scott Pieratt, REP #44
Principal Scientist

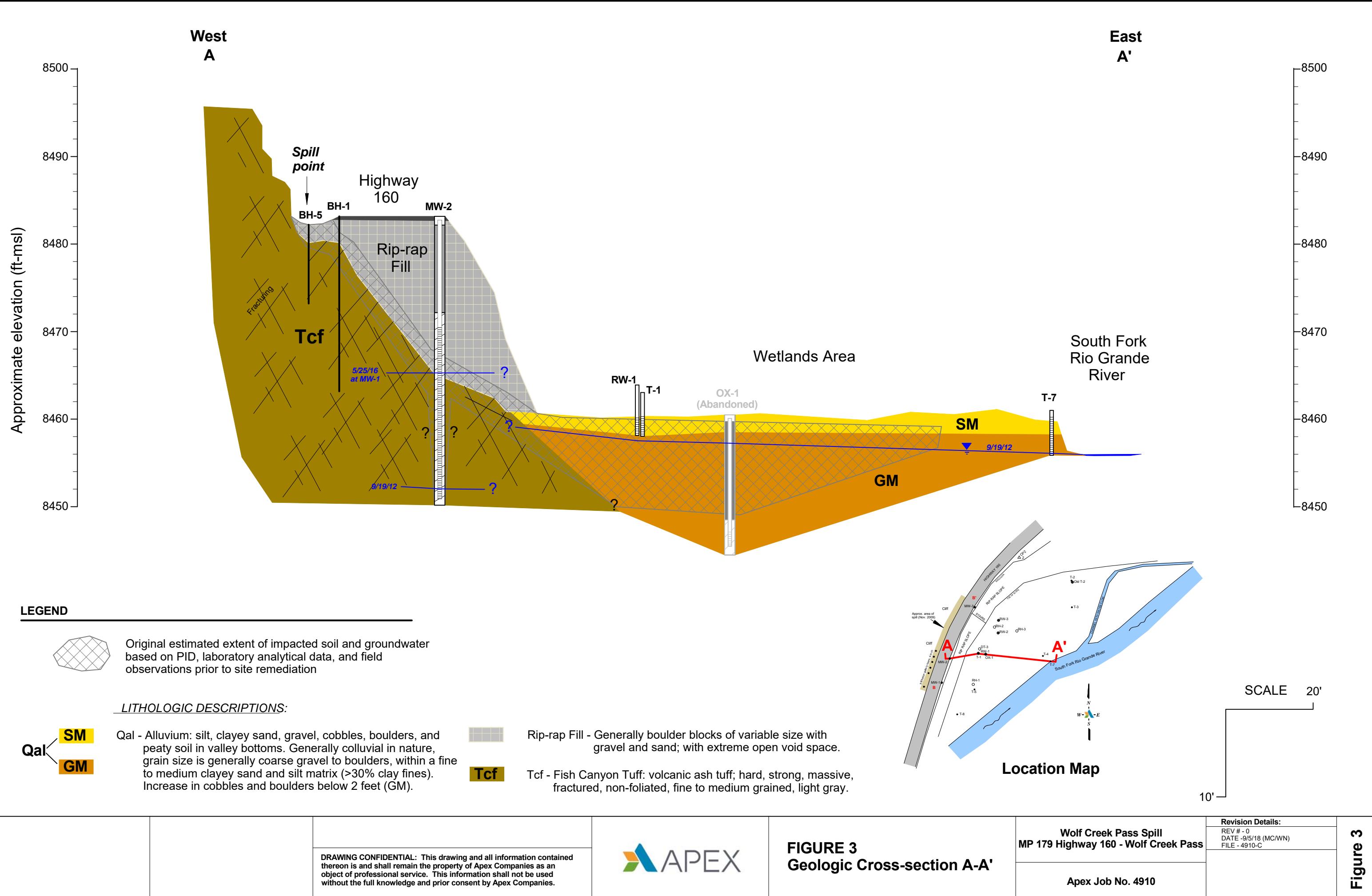
Cc: Stephen Bouton, Action Environmental

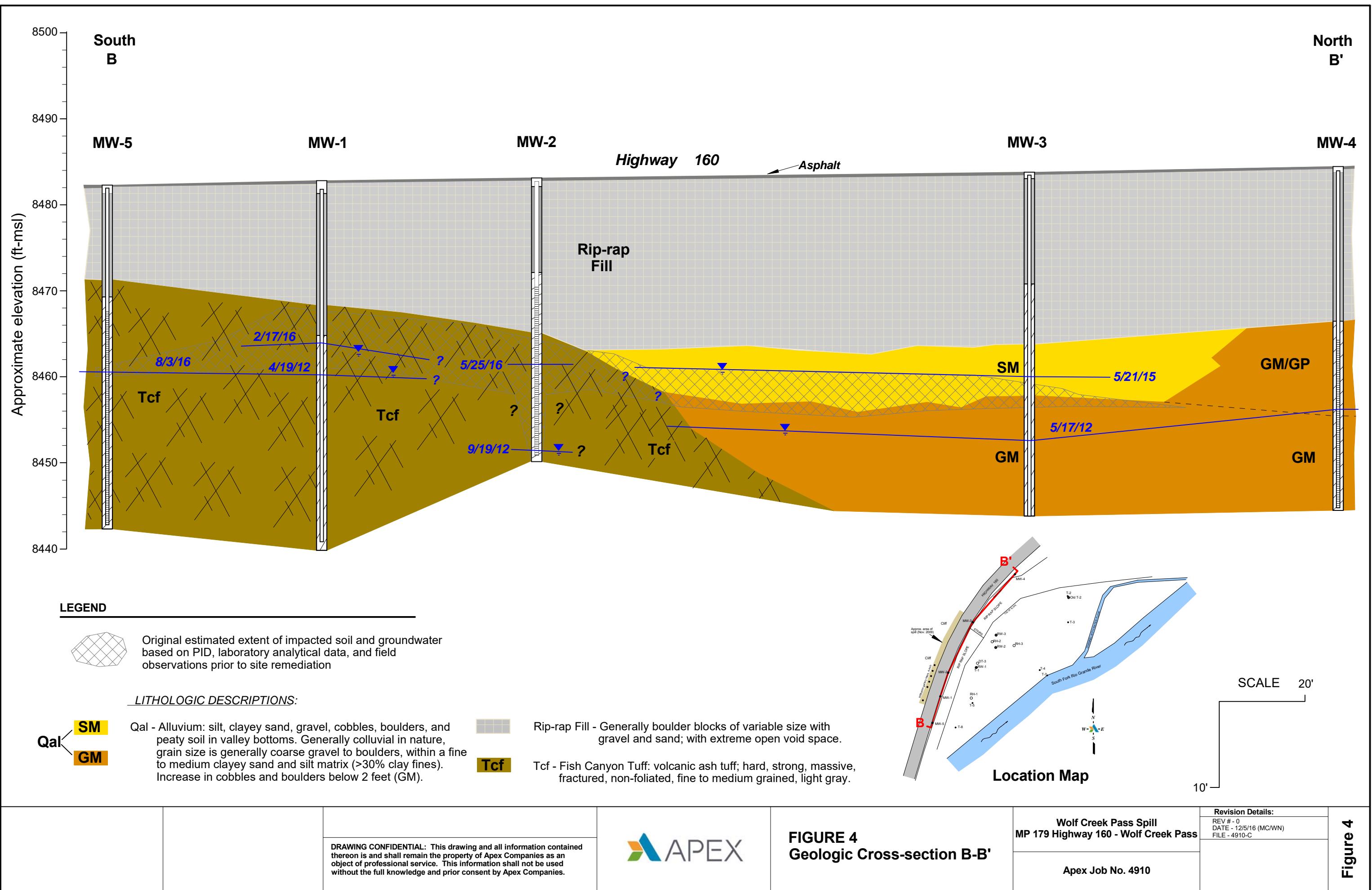
Attachments:

Figures
Tables
Laboratory Data









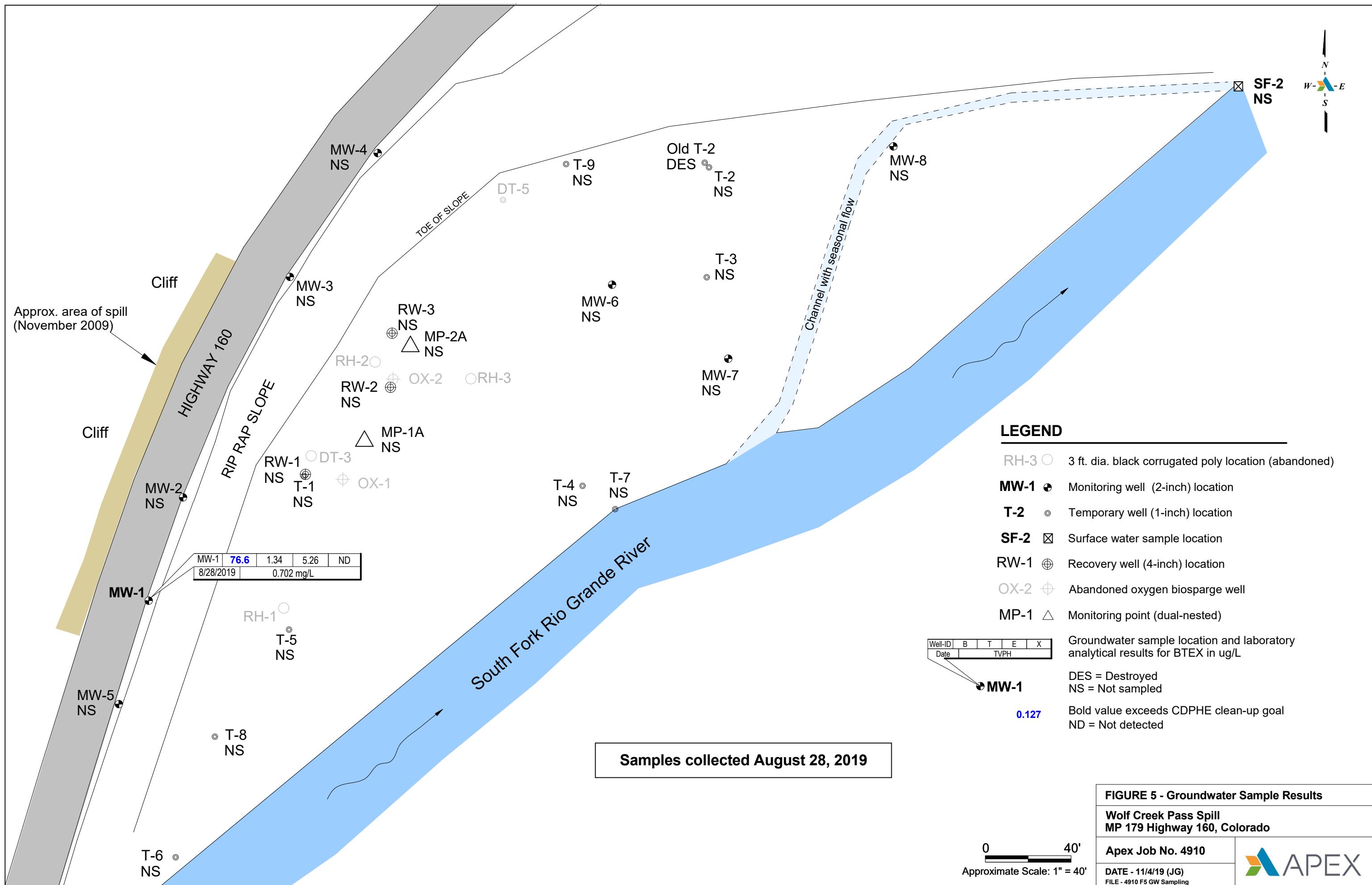


TABLE 1
GROUNDWATER SAMPLE RESULTS
WOLF CREEK SPILL SITE
US Highway 160 at MM 179.5, Colorado

Sample Date	Sample ID	Benzene ($\mu\text{g}/\text{L}$)	Toluene ($\mu\text{g}/\text{L}$)	Ethylbenzene ($\mu\text{g}/\text{L}$)	Xylenes ($\mu\text{g}/\text{L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
10/5/2010	DT-3	330	4,390	392	6,350	35.5	-	-	-
10/19/2010	DT-3	298	4,020	218	5,550	33.6	-	-	-
11/18/2010	DT-3	205	2,320	7	4,140	30.2	-	-	-
7/1/2011	DT-3	97	1,090	220	3,240	23.6	-	-	-
7/14/2011	DT-3	86	816	33	2,290	14.8	-	-	-
7/28/2011	DT-3	77	845	<1.0	3,040	22.2	-	-	-
8/11/2011	DT-3	90	653	5	1,700	12	-	-	-
8/24/2011	DT-3	97	398	3	1,440	10.3	-	-	-
9/8/2011	DT-3	84	451	<1.0	1,290	18.8	-	-	-
9/22/2011	DT-3	79	607	5	1,560	14.8	-	-	-
10/6/2011	DT-3	32	307	<1.0	622	5.48	-	-	-
10/20/2011	DT-3	62	333	<1.0	1,400	13	-	-	-
11/3/2011	DT-3	85	619	9	1,560	13.8	-	-	-
11/18/2011	DT-3	122	733	10	2,160	14.8	-	-	-
12/15/2011	DT-3	70	309	<1.0	1,070	10.2	-	-	-
1/13/2012	DT-3	51	242	<1.0	1,010	11	-	-	-
2/9/2012	DT-3	49	281	<1.0	1,020	10.3	1.01	3.42	8457.88
3/13/2012	DT-3	41	297	4	865	5.53	0.54	-	-
4/4/2012	DT-3	124	1,110	121	1,390	12.5	1.04	1.45	8459.85
4/18/2012	DT-3	157	843	<1.0	2,240	12.7	0.075	2.05	8459.25
5/3/2012	DT-3	81	543	36	1,960	16.1	0.94	1.70	8459.60
5/16/2012	DT-3	26	53	<1.0	562	4.7	0.45	1.60	8459.70
6/15/2012	DT-3	23	87	<1.0	724	4.84	0.65	3.00	8458.30
7/19/2012	DT-3	28	349	242	1,290	8.4	1.76	3.62	8457.68
8/15/2012	DT-3	24	282	162	878	9.14	0.24	3.88	8457.42
9/19/2012	DT-3	26	246	186	1,030	7.28	0.83	3.98	8457.32
10/18/2012	DT-3	20	291	186	965	8.93	1.12	4.00	8457.30
12/12/2012	DT-3	18	98	181	920	3.57	1.74	3.40	8457.90
4/25/2013	DT-3	16	121	58	295	2.4	8.7	2.37	8458.93
5/13/2013	DT-3	Abandoned							
3/14/2012	DT-5	<1	2	<1	7	<0.5	7.68	-	-
7/19/2012	DT-5	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
4/25/2013	DT-5	<1.0	<1.0	<1.0	<1.0	<0.1	4.23	-	-
7/19/2012	MP-1A	157	1,080	242	1,910	13.1	1.2	3.00	-
8/15/2012	MP-1A	-	-	-	-	-	-	3.25	-
10/18/2012	MP-1A	68.3	309	265	1,210	10.7	16.32	3.35	-
12/12/2012	MP-1A	-	-	-	-	-	4.42	2.61	-
8/8/2013	MP-1A	9.9	111	201	1,080	12.8	0.85	2.58	-
11/13/2013	MP-1A	<4.0	90	149	1,130	9.48	26.48	3.06	-
5/15/2014	MP-1A	<4.0	11.1	80.1	474	4.57	19.84	1.17	-
8/6/2014	MP-1A	2.2	8.0	112	413	9.22	1.95	2.88	-
11/6/2014	MP-1A	1.6	5.2	62.6	371	5.92	4.64	2.73	-
12/3/2014	MP-1A	-	-	-	-	-	7.23	2.38	-
12/19/2014	MP-1A	-	-	-	-	-	4.99	2.39	-
2/19/2015	MP-1A	<1.0	13.9	99.3	400	10.0	3.33	2.36	-
4/9/2015	MP-1A	2.9	10.6	93.4	397	9.19	3.73	1.53	-
5/21/2015	MP-1A	2.1	3.0	48.1	184	6.27	23.3	0.30	-
8/13/2015	MP-1A	<2.0	2.7	35.3	78.3	2.65	2.05	2.83	-
11/18/2015	MP-1A	<4.0	4.0	39.7	124.0	7.80	3.25	2.55	-

TABLE 1
GROUNDWATER SAMPLE RESULTS
WOLF CREEK SPILL SITE
US Highway 160 at MM 179.5, Colorado

Sample Date	Sample ID	Benzene ($\mu\text{g/L}$)	Toluene ($\mu\text{g/L}$)	Ethylbenzene ($\mu\text{g/L}$)	Xylenes ($\mu\text{g/L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
2/17/2016	MP-1A	<1.0	5.6	38.0	125	8.65	6.60	1.30	-
5/25/2016	MP-1A	2.14	3.48	45.5	129	8.07	3.42	0.05	-
8/3/2016	MP-1A	<1.00	1.45	22.6	37.6	6.97	2.45	3.18	-
11/16/2016	MP-1A	<1.0	1.9	19.2	40.1	8.08	4.24	3.38	-
4/26/2017	MP-1A	<1.0	<1.0	23.5	59.2	4.49	2.51	0.52	-
8/16/2017	MP-1A	<1.0	2.5	13.7	21.8	5.56	1.67	3.15	-
11/16/2017	MP-1A	<1.0	<1.0	10.6	21.6	3.82	2.33	3.17	-
5/16/2018	MP-1A	<1.0	2.3	14.4	28.7	8.45	0.64	0.83	-
12/12/2012	MP-1B	-	-	-	-	-	13.56	9.60	-
7/19/2012	MP-2A	26.9	1,120	751	3,790	17.9	0.61	2.96	-
8/15/2012	MP-2A	-	-	-	-	-	-	3.16	-
10/18/2012	MP-2A	-	-	-	-	-	1.9	3.25	-
12/12/2012	MP-2A	81.5	265	335	1,030	2.4	7.44	1.44	-
8/8/2013	MP-2A	3.7	6.0	9.4	23.6	0.441	13.59	2.41	-
11/13/2013	MP-2A	<1.0	<1.0	<1.0	<1.0	<0.100	3.28	2.85	-
5/15/2014	MP-2A	<1.0	6.8	6.8	48	0.334	24.64	1.20	-
8/6/2014	MP-2A	1.4	16.1	47.9	229	1.80	9.45	2.72	-
11/6/2014	MP-2A	<1.0	<1.0	<1.0	<1.0	<0.100	32.11	2.60	-
12/3/2014	MP-2A	-	-	-	-	-	14.12	2.05	-
12/19/2014	MP-2A	-	-	-	-	-	13.64	2.35	-
2/19/2015	MP-2A	7.4	66.2	241	566	7.63	5.76	2.30	-
4/9/2015	MP-2A	1.9	15.0	55.4	211	1.53	3.94	1.53	-
5/21/2015	MP-2A	<1.0	1.7	15.9	33	0.35	34.95	0.30	-
8/13/2015	MP-2A	<1.0	<1.0	<1.0	<1.0	<0.100	28.96	1.09	-
11/18/2015	MP-2A	<4.0	<4.0	<4.0	8.2	<0.4	15.65	2.24	-
2/17/2016	MP-2A	4.2	5.4	25.6	67.2	1.52	8.98	1.10	-
5/25/2016	MP-2A	<1.00	<1.00	<1.00	1.54	0.159	5.76	0.00	-
8/3/2016	MP-2A	<1.00	<1.00	<1.00	<1.00	<0.100	2.15	2.75	-
11/16/2016	MP-2A	<1.0	<1.0	<1.0	<1.0	<0.100	5.12	3.10	-
4/26/2017	MP-2A	<1.0	<1.0	<1.0	<1.0	<0.100	4.64	0.69	-
10/18/2012	MP-2B	83.3	248	467	602	7.8	1.9	3.40	-
1/13/2012	MW-1	429	1,270	10	2,040	16.6	2.23	20.40	8461.41
2/9/2012	MW-1	83	96	<1	218	1.61	10.36	20.18	8461.63
3/14/2012	MW-1	124	253	<1	462	3.06	7.92	18.58	8463.23
4/4/2012	MW-1	125	141	23	385	3.09	2.46	19.12	8462.69
4/19/2012	MW-1	132	210	<1.0	542	3.83	1.77	21.50	8460.31
5/3/2012	MW-1	100	117	<1.0	360	3.12	1.01	20.30	8461.51
5/17/2012	MW-1	116	105	<1.0	434	3.18	1.04	20.40	8461.41
6/15/2012	MW-1	30	3	<1.0	49	0.73	0.98	20.50	8461.31
7/19/2012	MW-1	180	191	124	728	6.49	0.99	20.25	8461.56
8/15/2012	MW-1	187	275	372	1,330	8.82	0.11	20.10	8461.71
9/19/2012	MW-1	184	203	215	817	6.13	0.58	20.27	8461.76
10/18/2012	MW-1	288	270	274	1,100	9.72	1.36	20.35	8461.68
12/12/2012	MW-1	160	197	278	1,430	4.59	1.42	20.75	8461.28
4/25/2013	MW-1	132	29.6	143	326	5.59	1.25	19.37	8462.66
6/13/2013	MW-1	209	31.0	115	267	7.75	2.20	20.65	8461.38
8/8/2013	MW-1	151	123.0	155	401	6.12	3.50	18.53	8463.50
11/13/2013	MW-1	106	16.0	20.5	93.6	4.85	3.11	19.75	8462.28
2/13/2014	MW-1	134.0	15.4	44.8	133	3.2	2.42	19.42	8462.61

TABLE 1
GROUNDWATER SAMPLE RESULTS
WOLF CREEK SPILL SITE
US Highway 160 at MM 179.5, Colorado

Sample Date	Sample ID	Benzene ($\mu\text{g}/\text{L}$)	Toluene ($\mu\text{g}/\text{L}$)	Ethylbenzene ($\mu\text{g}/\text{L}$)	Xylenes ($\mu\text{g}/\text{L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
5/15/2014	MW-1	101	9.7	21.6	82	3.79	2.34	18.33	8463.70
8/6/2014	MW-1	143	21.2	19.1	113	6.26	2.54	19.07	8462.96
11/6/2014	MW-1	98.5	4.3	5.9	54.6	2.34	5.72	19.05	8462.98
2/19/2015	MW-1	84.7	3.0	8.7	49.3	3.70	2.42	19.65	8462.38
5/21/2015	MW-1	122	5.9	8.7	34.4	3.51	2.42	18.40	8463.63
8/13/2015	MW-1	9.45	8.6	3.8	30.1	2.47	4.35	18.93	8463.10
11/18/2015	MW-1	60.7	3.5	1.3	12.8	2.97	2.69	18.85	8463.18
2/17/2016	MW-1	42.3	3.2	1.0	6.0	2.11	2.64	18.10	8463.93
5/25/2016	MW-1	137	6.94	6.63	14.0	2.53	2.46	18.30	8463.73
8/3/2016	MW-1	159	16.7	5.14	24.2	2.32	4.64	19.85	8462.18
11/16/2016	MW-1	89.2	1.6	6.3	20.8	0.97	2.76	20.20	8461.83
4/26/2017	MW-1	77.8	3.4	3.0	4.2	1.35	2.64	18.22	8463.81
8/16/2017	MW-1	46.6	1.5	1.0	5.4	0.838	2.11	18.90	8463.13
11/16/2017	MW-1	40.2	<1.0	2.48	6.67	0.609	1.75	18.62	8463.41
5/16/2018	MW-1	16.9	1.1	<1.0	<1.0	0.919	1.01	18.35	8463.68
8/22/2018	MW-1	127	1.7	23	11.6	0.873	1.29	20.01	8462.02
8/28/2019	MW-1	76.6	1.3	5.3	<1.0	0.702	0.43	18.83	8463.20
9/16/2011	MW-2	-	-	-	-	-	1.29	-	-
9/23/2011	MW-2	1,220	6,880	556	4,570	53.6	-	-	-
10/6/2011	MW-2	2,390	15,200	1,310	8,030	83.2	1.48	-	-
10/20/2011	MW-2	2,870	25,100	2,580	13,900	179	1.51	-	-
11/18/2011	MW-2	2,720	23,700	2,510	14,000	159	1.43	-	-
12/15/2011	MW-2	1,330	12,900	937	7,920	92	-	-	-
12/16/2011	MW-2	-	-	-	-	-	1.46	-	-
1/13/2012	MW-2	947	9,890	550	3,760	48.4	-	30.63	8452.06
2/9/2012	MW-2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
4/5/2012	MW-2	695	8,510	327	9,560	55.9	9.41	18.60	8464.09
4/19/2012	MW-2	619	6,240	213	5,630	38.8	5.29	29.70	8452.99
5/3/2012	MW-2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
5/17/2012	MW-2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
6/15/2012	MW-2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
7/19/2012	MW-2	886	8,400	673	7,760	26.8	1.82	30.68	8452.01
8/15/2012	MW-2	631	7,450	581	7,440	33	Insufficient	30.92	8451.77
9/19/2012	MW-2	471	5,610	482	7,520	25	2.25	31.11	8451.58
10/18/2012	MW-2	402	4,480	399	6,900	2.86	1.22	30.88	8451.81
12/12/2012	MW-2	364	3,870	312	7,390	11.8	1.32	30.88	8451.81
4/25/2013	MW-2	328	3,940	372	5,580	18.9	1.33	30.04	8452.65
6/13/2013	MW-2	243	3,020	274	4,620	26.4	2.42	29.90	8452.79
8/8/2013	MW-2	120	1,440	137	3,380	10	3.12	30.33	8452.36
11/13/2013	MW-2	68	1,040	106	2,830	16.2	2.64	29.77	8452.92
2/13/2014	MW-2	45.2	856	99.6	2,700	11.7	2.39	29.95	8452.74
5/15/2014	MW-2	32.4	630	97	1,900	9.61	2.13	29.13	8453.56
8/6/2014	MW-2	24.9	368	52.4	1,160	6.48	3.24	28.48	8454.21
11/6/2014	MW-2	21.0	253	54.6	732	5.11	5.42	28.33	8454.36
2/19/2015	MW-2	9.2	146	29.1	366	3.13	1.90	29.63	8453.06
5/21/2015	MW-2	8.4	43.5	17.6	212	1.46	2.33	28.18	8454.51
8/13/2015	MW-2	9.8	75.3	30.1	276	2.59	1.66	28.83	8453.86
11/18/2015	MW-2	11.9	83.2	26.6	259	1.87	2.32	28.52	8454.17
2/17/2016	MW-2	9.6	69.1	35.1	321	2.08	2.55	29.45	8453.24

TABLE 1
GROUNDWATER SAMPLE RESULTS
WOLF CREEK SPILL SITE
US Highway 160 at MM 179.5, Colorado

Sample Date	Sample ID	Benzene ($\mu\text{g/L}$)	Toluene ($\mu\text{g/L}$)	Ethylbenzene ($\mu\text{g/L}$)	Xylenes ($\mu\text{g/L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
5/25/2016	MW-2	17.7	82.3	43.0	339	1.76	2.11	21.30	8461.39
8/3/2016	MW-2	21.2	116	60.6	476	2.75	2.08	27.65	8455.04
11/16/2016	MW-2	4.4	7.1	10.2	124	0.85	1.96	28.95	8453.74
4/26/2017	MW-2	16.9	32.8	30.6	258	1.17	2.02	21.83	8460.86
8/16/2017	MW-2	44.6	1.3	1.0	5.1	0.85	3.34	24.88	8457.81
11/16/2017	MW-2	19.4	24.6	42.8	355	1.86	1.96	23.69	8459.00
5/16/2018	MW-2	33.9	91.6	81.9	586.0	2.45	2.42	24.93	8457.76
2/9/2012	MW-3	31	20	<1.0	69	99	4.34	26.45	8457.00
3/14/2012	MW-3	95	131	29.0	289	2.86	0.79	24.35	8459.10
4/4/2012	MW-3	<1.0	<1.0	<1.0	3	<0.5	1.86	22.85	8460.60
4/19/2012	MW-3	<1.0	<1.0	<1.0	<1.0	<0.5	1.52	24.50	8458.95
5/3/2012	MW-3	8	2	<1.0	14	<0.5	1.03	24.65	8458.80
5/17/2012	MW-3	11.0	3	<1.0	5	<0.5	1.74	31.00	8452.45
6/15/2012	MW-3	4	<1.0	<1.0	3	<0.5	2.1	26.20	8457.25
7/19/2012	MW-3	44.1	8	16.9	35	0.909	1.24	26.91	8456.54
8/15/2012	MW-3	56.9	20	30.4	46	1.27	0.12	27.19	8456.26
9/19/2012	MW-3	106	86	46.6	125	3.08	1.18	27.31	8456.21
10/18/2012	MW-3	53.9	56	32.5	76	2.33	1.51	27.39	8456.13
12/12/2012	MW-3	47.6	101	41.9	133	1.24	1.52	26.58	8456.94
4/25/2013	MW-3	5.3	4	14.2	25	0.967	2.42	24.83	8458.69
6/13/2013	MW-3	23.8	102	87.7	347	1.72	2.88	25.67	8457.85
8/8/2013	MW-3	10.0	24	21.2	36	1.21	3.34	26.40	8457.12
11/13/2013	MW-3	5.1	2.7	14.8	15.6	0.92	2.42	26.85	8456.67
2/13/2014	MW-3	34.8	36.1	95.5	301	1.45	2.52	25.70	8457.82
5/15/2014	MW-3	6.6	1.0	16.2	19	1.38	2.16	24.75	8458.77
8/6/2014	MW-3	2.8	1.0	7.8	9.9	0.555	3.77	26.60	8456.92
11/6/2014	MW-3	4.5	2.0	6.2	16.7	0.764	6.23	26.35	8457.17
2/19/2015	MW-3	9.0	<1.0	13.5	13.6	0.974	2.15	26.09	8457.43
5/21/2015	MW-3	5.7	<1.0	4.2	3.5	0.720	2.62	23.29	8460.08
8/13/2015	MW-3	<1.0	<1.0	7.0	6.0	0.338	4.39	26.32	8457.05
11/18/2015	MW-3	1.6	<1.0	3.6	3.8	0.752	2.84	25.85	8457.52
2/17/2016	MW-3	<1.0	<1.0	<1.0	<1.0	0.217	2.36	24.62	8458.75
5/25/2016	MW-3	1.45	<1.00	<1.00	<1.00	0.110	3.42	23.60	8459.77
8/3/2016	MW-3	23.8	1.56	10.0	7.43	0.426	1.98	26.85	8456.52
11/16/2016	MW-3	1.1	<1.0	1.2	<1.0	0.288	2.32	27.02	8456.35
4/26/2017	MW-3	1.6	<1.0	<1.0	<1.0	0.107	2.61	24.75	8458.62
8/16/2017	MW-3	1.1	<1.0	1.4	<1.0	0.161	2.76	26.65	8456.72
11/16/2017	MW-3	<1.0	<1.0	<1.0	<1.0	<0.100	3.65	27.20	8456.17
5/16/2018	MW-3	11.2	2.6	21.2	21.6	1.17	3.01	24.62	8458.75
7/19/2012	MW-4	<1.0	<1.0	<1.0	<1.0	<0.100	2.81	27.24	8456.59
8/15/2012	MW-4	<1.0	<1.0	<1.0	<1.0	<0.100	4.02	27.73	8456.10
9/19/2012	MW-4	<1.0	<1.0	<1.0	<1.0	<0.100	6.25	27.66	8456.22
10/18/2012	MW-4	<1.0	<1.0	<1.0	<1.0	<0.100	1.88	27.78	8456.10
12/12/2012	MW-4	<1.0	<1.0	<1.0	<1.0	<0.100	1.65	26.75	8457.13
4/25/2013	MW-4	<1.0	<1.0	<1.0	<1.0	<0.100	5.18	25.15	8458.73
6/13/2013	MW-4	<1.0	<1.0	<1.0	<1.0	<0.100	4.75	25.70	8458.18
8/8/2013	MW-4	<1.0	<1.0	<1.0	<1.0	<0.100	6.98	26.34	8457.54
11/13/2013	MW-4	<1.0	<1.0	<1.0	<1.0	<0.100	6.13	26.87	8457.01
5/15/2014	MW-4	<1.0	<1.0	<1.0	<1.0	<0.100	4.93	25.26	8458.62

TABLE 1
GROUNDWATER SAMPLE RESULTS
WOLF CREEK SPILL SITE
US Highway 160 at MM 179.5, Colorado

Sample Date	Sample ID	Benzene ($\mu\text{g/L}$)	Toluene ($\mu\text{g/L}$)	Ethylbenzene ($\mu\text{g/L}$)	Xylenes ($\mu\text{g/L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
8/6/2014	MW-4	<1.0	<1.0	<1.0	<1.0	<0.100	6.20	26.49	8457.39
11/6/2014	MW-4	<1.0	<1.0	<1.0	<1.0	<0.100	8.19	26.20	8457.68
2/19/2015	MW-4	<1.0	<1.0	<1.0	<1.0	<0.100	4.98	26.58	8457.30
8/13/2015	MW-4	-	-	-	-	-	-	26.15	8457.73
11/18/2015	MW-4	-	-	-	-	-	-	-	-
7/19/2012	MW-5	58.5	87.6	78.8	337	2.63	1.54	21.24	8460.70
8/15/2012	MW-5	102	163	69.0	394	4.68	1.15	21.17	8460.77
9/19/2012	MW-5	48.5	94.5	32.8	181	1.62	1.64	21.29	8460.77
10/18/2012	MW-5	80.3	109	73.5	426	3.8	1.75	21.36	8460.70
12/12/2012	MW-5	61.1	54.8	3.2	229	3.86	1.87	21.62	8460.44
4/25/2013	MW-5	14.3	23.6	12.4	74.4	0.849	2.04	20.95	8461.11
6/13/2013	MW-5	31.1	13.8	8.5	73.7	0.963	2.04	21.45	8460.61
8/8/2013	MW-5	20.8	19.9	4.4	50.9	1.35	4.18	20.82	8461.24
11/13/2013	MW-5	85	<4.0	<4.0	36.5	2.76	1.48	21.25	8460.81
2/13/2014	MW-5	25.6	<1.0	<1.0	3.2	0.618	2.85	21.02	8461.04
5/15/2014	MW-5	10.9	<1.0	<1.0	<1.0	0.136	4.30	20.40	8461.66
8/6/2014	MW-5	22.9	<1.0	<1.0	18.5	0.397	2.63	20.90	8461.16
11/6/2014	MW-5	6.0	<1.0	<1.0	1.9	<0.100	6.53	20.94	8461.12
2/19/2015	MW-5	2.9	<1.0	<1.0	<1.0	0.243	1.98	21.11	8460.95
8/13/2015	MW-5	21.5	<1.0	<1.0	21.7	<0.1	1.41	21.13	8460.93
11/18/2015	MW-5	-	-	-	-	-	-	21.15	8460.91
2/17/2016	MW-5	16.2	5.4	14.0	37.1	0.679	4.66	20.58	8461.48
8/3/2016	MW-5	38.6	17.2	<1.0	50.8	0.779	2.11	21.38	8460.68
8/16/2017	MW-5	2.8	<1.0	<1.0	5.7	<0.1	2.65	21.35	8460.71
11/16/2017	MW-5	29.5	<1.0	16.4	35.8	0.965	1.87	21.25	8460.81
5/16/2018	MW-5	1.3	<1.0	<1.0	<1.0	<0.100	3.52	21.03	8461.03
7/19/2012	MW-6	23.4	527	211	1,280	6.01	0.9	6.79	8456.77
8/15/2012	MW-6	20.8	391	301	1,160	8.18	0.79	7.02	8456.54
9/19/2012	MW-6	19.1	345	272	920	6.5	1.24	7.03	8456.53
10/18/2012	MW-6	37.1	394	399	1,130	10.6	1.45	7.11	8456.45
12/12/2012	MW-6	19.0	160	256	975	3.07	1.55	6.12	8457.44
3/19/2013	MW-6	3.0	19.0	9.3	347	1.88	1.42	4.58	8458.98
5/14/2013	MW-6	74.3	757	376	2,640	16.5	1.42	5.10	8458.46
6/13/2013	MW-6	35.8	453	291	2,200	15.2	1.1	5.76	8457.80
7/10/2013	MW-6	4.9	28.0	125	628	8.92	2.37	6.81	8456.75
8/8/2013	MW-6	16.9	206	210	815	6.59	1.45	6.40	8457.16
11/13/2013	MW-6	<1.0	<1.0	<1.0	<1.0	0.203	3.64	6.83	8456.73
2/13/2014	MW-6	2.4	3.6	54	209	3.18	3.15	5.58	8457.98
5/15/2014	MW-6	<1.0	<1.0	<1.0	<1.0	0.196	3.01	5.25	8458.31
8/6/2014	MW-6	<1.0	<1.0	8.1	16.1	1.78	1.79	6.65	8456.91
11/6/2014	MW-6	<1.0	<1.0	<1.0	<1.0	0.307	3.20	6.67	8456.89
12/3/2014	MW-6	-	-	-	-	-	3.28	5.95	8457.61
12/19/2014	MW-6	-	-	-	-	-	2.99	6.60	8456.96
1/27/2015	MW-6	-	-	-	-	-	2.55	6.18	8457.38
2/19/2015	MW-6	12.6	9.1	35.4	84.5	3.03	2.17	6.35	8457.21
4/9/2015	MW-6	2.8	7.5	16.0	144	2.26	5.82	5.71	8457.85
5/21/2015	MW-6	<1.0	<1.0	<1.0	4.5	0.322	5.10	5.50	8458.06
8/13/2015	MW-6	<1.0	<1.0	<1.0	<1.0	<0.100	1.42	6.58	8456.98
11/18/2015	MW-6	<1.0	<1.0	<1.0	<1.0	<0.100	2.06	6.15	8457.41

TABLE 1
GROUNDWATER SAMPLE RESULTS
WOLF CREEK SPILL SITE
US Highway 160 at MM 179.5, Colorado

Sample Date	Sample ID	Benzene ($\mu\text{g/L}$)	Toluene ($\mu\text{g/L}$)	Ethylbenzene ($\mu\text{g/L}$)	Xylenes ($\mu\text{g/L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
2/17/2016	MW-6	1.5	1.0	4.5	9.4	0.149	3.60	5.15	8458.41
5/4/2016	MW-6	1.0	<1.0	9.3	63.2	1.27	3.11	5.40	8458.16
5/25/2016	MW-6	1.62	<1.00	16.5	41.8	1.76	2.67	4.02	8459.54
6/9/2016	MW-6	<1.00	<1.00	20.3	25.2	1.31	2.47	3.88	8459.68
6/23/2016	MW-6	<1.00	<1.00	10.3	15.0	1.24	2.31	5.42	8458.14
7/6/2016	MW-6	2.28	3.73	39.2	43.6	1.45	2.24	6.15	8457.41
7/19/2016	MW-6	1.02	1.19	30.4	25.5	1.69	2.64	6.73	8456.83
8/3/2016	MW-6	<1.00	<1.00	5.96	5.23	1.06	2.67	6.85	8456.71
8/22/2016	MW-6	<1.0	<1.0	2.3	<1.0	0.862	2.79	6.93	8456.63
9/7/2016	MW-6	<1.0	<1.0	4.9	1.9	0.281	2.80	6.90	8456.66
9/21/2016	MW-6	<1.0	<1.0	7.2	<1.0	0.673	3.25	7.00	8456.56
10/5/2016	MW-6	<1.0	<1.0	4.0	<1.0	0.554	2.66	6.74	8456.82
11/16/2016	MW-6	<1.0	<1.0	17.2	5.0	1.15	4.07	7.13	8456.43
4/26/2017	MW-6	2.9	5.8	76.7	145.0	2.82	2.42	4.62	8458.94
7/19/2012	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	1.15	6.65	8456.00
8/15/2012	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	0.35	6.89	8455.76
9/19/2012	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	2.04	6.90	8455.75
10/18/2012	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	1.42	6.96	8455.69
12/12/2012	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	3.17	5.96	8456.69
4/25/2013	MW-7	<2.0	<2.0	<2.0	<2.0	<0.200	3.73	5.73	8456.92
5/14/2013	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	2.2	5.01	8457.64
6/13/2013	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	1.95	5.64	8457.01
7/10/2013	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	2.42	6.08	8456.57
8/8/2013	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	1.01	6.18	8456.47
11/13/2013	MW-7	1.2	1.1	9.3	21.4	0.741	1.58	6.76	8455.89
2/13/2014	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	4.36	5.44	8457.21
5/15/2014	MW-7	<1.0	<1.0	<1.0	<1.0	0.156	3.24	5.27	8457.38
8/6/2014	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	1.65	6.54	8456.11
11/6/2014	MW-7	2.2	<1.0	11.1	22.1	0.390	2.72	6.58	8456.07
12/3/2014	MW-7	-	-	-	-	-	2.54	5.82	8456.83
12/19/2014	MW-7	-	-	-	-	-	2.71	6.53	8456.12
1/27/2015	MW-7	-	-	-	-	-	2.93	5.98	8456.67
2/19/2015	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	4.06	6.17	8456.48
4/9/2015	MW-7	7.5	44.7	111	371	5.17	3.16	5.66	8456.99
5/21/2015	MW-7	3.5	3.9	28.1	77.8	1.47	4.20	4.60	8458.05
8/13/2015	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	0.88	6.45	8456.20
11/18/2015	MW-7	1.5	<1.0	12.6	11.9	0.662	2.42	6.02	8456.63
2/17/2016	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	4.52	5.05	8457.60
5/4/2016	MW-7	2.1	1.5	32.7	61.9	1.71	3.61	5.33	8457.32
5/25/2016	MW-7	<1.00	<1.00	<1.00	<1.00	<0.100	4.67	3.95	8458.70
6/9/2016	MW-7	<1.00	<1.00	<1.00	<1.00	<0.100	4.64	3.79	8458.86
6/23/2016	MW-7	<1.00	<1.00	<1.00	<1.00	<0.100	3.72	5.25	8457.40
7/6/2016	MW-7	<1.00	<1.00	<1.00	<1.00	<0.100	3.11	6.02	8456.63
7/19/2016	MW-7	<1.00	<1.00	<1.00	<1.00	<0.100	2.96	6.55	8456.10
8/3/2016	MW-7	<1.00	<1.00	<1.00	<1.00	<0.100	2.33	6.65	8456.00
8/22/2016	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	2.53	6.73	8455.92
9/7/2016	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	2.87	6.72	8455.93
9/21/2016	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	3.07	6.83	8455.82
10/5/2016	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	2.72	6.58	8457.07

TABLE 1
GROUNDWATER SAMPLE RESULTS
WOLF CREEK SPILL SITE
US Highway 160 at MM 179.5, Colorado

Sample Date	Sample ID	Benzene ($\mu\text{g}/\text{L}$)	Toluene ($\mu\text{g}/\text{L}$)	Ethylbenzene ($\mu\text{g}/\text{L}$)	Xylenes ($\mu\text{g}/\text{L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
11/16/2016	MW-7	<1.0	<1.0	<1.0	<1.0	<0.100	3.11	6.95	8455.70
4/26/2017	MW-7	<1.0	<1.0	<1.0	<1.0	0.191	2.83	4.55	8458.10
7/19/2012	MW-8	71.6	91	107	319	1.36	0.82	5.02	8455.93
8/15/2012	MW-8	63.0	21	172	322	2.62	0.58	5.25	8455.70
9/19/2012	MW-8	49.3	16	167	219	3.87	2.42	5.21	8455.74
10/18/2012	MW-8	37.3	9	91	136	1.31	1.64	5.28	8455.67
12/12/2012	MW-8	17.6	2	48	61	0.593	1.79	4.40	8456.55
4/25/2013	MW-8	3.9	<1.0	6.9	5.8	0.497	1.14	4.15	8456.80
5/14/2013	MW-8	7.8	<1.0	6.8	9.7	0.334	2.50	3.50	8457.45
6/13/2013	MW-8	7.1	<1.0	6.5	11.1	0.253	2.01	4.17	8456.78
7/10/2013	MW-8	2.4	<1.0	6.8	5.2	0.194	2.55	5.10	8455.85
8/8/2013	MW-8	2.7	<1.0	5.0	3.6	0.174	1.77	4.64	8456.31
11/13/2013	MW-8	<1.0	<1.0	<1.0	<1.0	<0.100	1.34	5.03	8455.92
5/15/2014	MW-8	1.1	<1.0	1.5	2.1	<0.100	3.64	3.78	8457.17
8/6/2014	MW-8	1.6	<1.0	2.0	<1.0	<0.100	2.20	4.94	8456.01
11/6/2014	MW-8	<1.0	<1.0	<1.0	<1.0	<0.100	3.19	4.91	8456.04
12/3/2014	MW-8	-	-	-	-	-	2.64	4.20	8456.75
12/19/2014	MW-8	-	-	-	-	-	2.62	4.90	8456.05
1/27/2015	MW-8	-	-	-	-	-	2.21	4.45	8456.50
2/19/2015	MW-8	<1.0	<1.0	<1.0	<1.0	<0.100	2.65	4.64	8456.31
4/9/2015	MW-8	<1.0	<1.0	<1.0	1.0	<0.100	3.31	3.90	8457.05
8/13/2015	MW-8	-	-	-	-	-	-	4.86	8456.09
11/18/2015	MW-8	-	-	-	-	-	-	4.35	8456.60
2/17/2016	MW-8	-	-	-	-	-	-	3.50	8457.45
11/18/2010	RH-1	24	377	18	1,060	8.94	-	-	-
7/1/2011	RH-1	31	546	23	1,720	13.8	-	-	-
7/14/2011	RH-1	20	197	<1.0	873	6.43	-	-	-
7/28/2011	RH-1	14	215	<1.0	899	8.2	-	-	-
8/11/2011	RH-1	14	338	15	1,120	7.74	-	-	-
8/24/2011	RH-1	14	255	10	937	7.69	-	-	-
9/8/2011	RH-1	5	40	<1.0	173	4.85	-	-	-
9/22/2011	RH-1	7	83	<1.0	284	3.57	-	-	-
10/6/2011	RH-1	13	102	6	284	2.78	-	-	-
10/20/2011	RH-1	4	38	<1.0	358	4.49	-	-	-
11/3/2011	RH-1	4	29	3	236	3.44	-	-	-
11/18/2011	RH-1	7	69	12	607	7.78	-	-	-
12/15/2011	RH-1	12	127	1	575	5.46	-	-	-
1/13/2012	RH-1	6	102	6	667	9.59	-	-	-
2/9/2012	RH-1	3	25	<1	327	4.67	0.95	2.66	8459.01
3/13/2012	RH-1	<1	7	<1	19	<0.5	2.29	-	-
4/4/2012	RH-1	18	181	101	489	4.65	6.4	1.35	8460.32
5/13/2013	RH-1	Abandoned							
7/1/2011	RH-2	422	12,400	1,590	21,200	115	-	-	-
7/14/2011	RH-2	166	3,370	399	8,120	36.7	-	-	-
4/4/2012	RH-2	159	2,310	288	4,420	31.40	1.66	0.33	-
4/18/2012	RH-2	71	2,560	46	4,670	26.60	1.09	1.50	-
5/3/2012	RH-2	50	1,630	232	4,370	26.50	1.44	1.20	-
5/16/2012	RH-2	28	536	<1.0	2,420	11.60	0.42	1.00	-
6/15/2012	RH-2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	-

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Sample Date	Sample ID	Benzene ($\mu\text{g}/\text{L}$)	Toluene ($\mu\text{g}/\text{L}$)	Ethylbenzene ($\mu\text{g}/\text{L}$)	Xylenes ($\mu\text{g}/\text{L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
5/13/2013	RH-2								
Abandoned									
10/5/2010	RH-3	1,480	21,000	1,690	15,900	96	-	-	-
10/19/2010	RH-3	1,120	15,900	1,360	12,100	82	-	-	-
11/18/2010	RH-3	1,030	11,700	882	10,300	104	-	-	-
12/15/2010	RH-3	876	13,100	1,690	11,000	66.3	1.7	-	-
1/7/2011	RH-3	771	10,200	982	10,600	69.9	2.2	-	-
1/21/2011	RH-3	1,040	13,800	999	14,600	91	-	-	-
2/4/2011	RH-3	970	9,140	617	8,840	60	-	-	-
2/22/2011	RH-3	777	15,500	1,660	15,200	79	4.6	-	-
3/11/2011	RH-3	720	11,000	1,380	11,300	83	5.9	-	-
3/24/2011	RH-3	865	13,500	1,930	13,100	103	5.4	-	-
4/7/2011	RH-3	1,060	16,300	1,920	17,100	135	6.4	-	-
4/22/2011	RH-3	979	16,300	1,390	24,300	194	6.5	-	-
5/3/2011	RH-3	786	14,100	1,940	17,700	105	4.9	-	-
5/19/2011	RH-3	487	8,370	1,170	17,400	99.7	1.6	-	-
6/3/2011	RH-3	371	6,350	619	14,600	97	1.6	-	-
6/16/2011	RH-3	219	4,300	51	12,000	79.7	1.4	-	-
7/1/2011	RH-3	396	9,420	1,011	23,900	123	1.7	-	-
7/14/2011	RH-3	252	5,760	677	10,500	54.6	0.6	-	-
7/28/2011	RH-3	177	4,860	161	9,470	55.9	1.4	-	-
8/11/2011	RH-3	146	4,090	194	7,890	47.6	1.7	-	-
8/24/2011	RH-3	179	4,720	354	8,440	50.8	-	-	-
9/8/2011	RH-3	128	3,730	234	6,140	71.8	0.2	-	-
9/22/2011	RH-3	118	3,350	50	6,110	46.3	0.9	-	-
10/6/2011	RH-3	102	3,580	181	7,480	46.8	1	-	-
10/20/2011	RH-3	113	4,650	498	8,400	80.8	1.1	-	-
11/3/2011	RH-3	135	4,810	442	8,050	61.5	1	-	-
11/18/2011	RH-3	136	4,510	342	9,290	66.1	1	-	-
12/15/2011	RH-3	83	2,560	151	6,120	56.5	0.83	-	-
1/13/2012	RH-3	71	3,730	49	6,110	42.7	1.43	-	-
2/9/2012	RH-3	71	2,180	15	4,390	34.9	0.69	5.58	8458.77
3/13/2012	RH-3	39	1,590	218	5,930	34.4	1.5	4.21	8460.14
4/4/2012	RH-3	156	3,320	218	8,820	59.4	0.56	3.00	8461.35
4/18/2012	RH-3	138	3,470	209	8,080	48.9	0.52	1.55	8462.80
5/3/2012	RH-3	66	2,360	351	6,030	39.1	0.47	3.85	8460.50
5/16/2012	RH-3	53	1,570	30	4,690	28	0.3	3.70	8460.65
6/15/2012	RH-3	54	1,910	19	5,280	39.6	0.4	4.40	8459.95
7/19/2012	RH-3	29.5	1,900	576	3,730	19.3	1.32	5.81	8458.54
8/15/2012	RH-3	23.9	1,490	575	3,370	11.3	0.42	6.05	8458.30
9/19/2012	RH-3	17.5	1,140	438	2,610	14.4	1.13	6.06	8458.29
10/18/2012	RH-3	11.4	639	32	1,810	11.6	1.03	6.13	8458.22
12/12/2012	RH-3	13.7	967	303	2,730	6.56	1.69	5.18	8459.17
4/25/2013	RH-3	37	1,120	620	2,760	25.7	3.87	5.80	8458.55
5/13/2013	RH-3								
Abandoned									
11/18/2010	RH-4	134	1,070	17	4,200	26.9	-	-	-
3/13/2012	RH-4	<1.0	1	<1.0	35	1.54	-	-	-
5/13/2013	RH-4								
Abandoned									
7/19/2012	RW-1	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/15/2012	RW-1	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY

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9/19/2012	RW-1	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
10/18/2012	RW-1	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
12/12/2012	RW-1	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
4/25/2013	RW-1	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
6/13/2013	RW-1	DRY	DRY	DRY	DRY	DRY	DRY	4.10	8458.85
8/8/2013	RW-1	DRY	DRY	DRY	DRY	DRY	DRY	4.72	8458.23
11/13/2013	RW-1	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
5/15/2014	RW-1	-	-	-	-	-	-	3.30	8459.65
3/14/2012	RW-2	<1	223	20	874	7.53	-	-	-
3/14/2012	RW-2	<1	223	20	874	7.53	-	-	-
7/19/2012	RW-2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/15/2012	RW-2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
9/19/2012	RW-2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
10/18/2012	RW-2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
12/12/2012	RW-2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
4/25/2013	RW-2	DRY	DRY	DRY	DRY	DRY	DRY	1.87	8458.63
11/13/2013	RW-2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
5/15/2014	RW-2	-	-	-	-	-	-	1.35	8459.15
7/19/2012	RW-3	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/15/2012	RW-3	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
9/19/2012	RW-3	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
10/18/2012	RW-3	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
12/12/2012	RW-3	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
4/25/2013	RW-3	-	-	-	-	-	-	3.26	8458.18
6/13/2013	RW-3	-	-	-	-	-	-	3.45	8457.99
8/8/2013	RW-3	-	-	-	-	-	-	4.05	8457.39
11/13/2013	RW-3	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
5/15/2014	RW-3	-	-	-	-	-	-	2.75	8458.69
12/16/2009	T-2	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
12/28/2009	T-2	37	113	1	83	0.68	-	-	-
1/3/2010	T-2	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
1/11/2010	T-2	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
1/18/2010	T-2	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
1/25/2010	T-2	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
2/17/2010	T-2	2	17	6	29	<0.5	-	-	-
3/2/2010	T-2	<1.0	10	3	13	<0.5	-	-	-
3/16/2010	T-2	<1.0	<1.0	<1.0	2	<0.5	-	-	-
3/23/2010	T-2	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
3/29/2010	T-2	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
4/6/2010	T-2	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
4/14/2010	T-2	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
4/20/2010	T-2	20	42	5	73	<0.5	-	-	-
4/27/2010	T-2	31	48	1	145	0.56	-	-	-
5/4/2010	T-2	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
5/5/2010	T-2	-	-	-	-	-	2.1	-	-
5/11/2010	T-2	<1.0	<1.0	<1.0	2	<0.5	0.6	-	-
5/18/2010	T-2	6	11	1	11	<0.5	2.3	-	-
5/25/2010	T-2	19	86	5	39	<0.5	3.9	-	-
6/1/2010	T-2	55	317	24	196	1.58	2.7	-	-

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Sample Date	Sample ID	Benzene ($\mu\text{g}/\text{L}$)	Toluene ($\mu\text{g}/\text{L}$)	Ethylbenzene ($\mu\text{g}/\text{L}$)	Xylenes ($\mu\text{g}/\text{L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
6/9/2010	T-2	41	238	21	149	1.29	1.9	-	-
6/15/2010	T-2	10	31	3	36	< 0.5	1.9	-	-
6/22/2010	T-2	<1.0	<1.0	<1.0	<1.0	< 0.5	3.8	-	-
6/30/2010	T-2	2	6	1	7	< 0.5	0.3	-	-
7/6/2010	T-2	2	13	1	9	< 0.5	3.3	-	-
7/13/2010	T-2	2	20	<1.0	8	< 0.5	2	-	-
7/27/2010	T-2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/12/2010	T-2	2	50	1	6	< 0.5	1.3	-	-
8/25/2010	T-2	1	26	<1.0	3	< 0.5	DRY	DRY	DRY
9/9/2010	T-2	3	11	<1.0	4	< 0.5	1.4	-	-
9/23/2010	T-2	4	7	<1.0	2	< 0.5	2.6	-	-
10/5/2010	T-2	19	19	<1.0	4	< 0.5	1	-	-
10/19/2010	T-2	26	32	<1.0	4	< 0.5	0.6	-	-
11/4/2010	T-2	11	9	<1.0	3	< 0.5	1	-	-
11/18/2010	T-2	19	<1.0	<1.0	2	< 0.5	1.2	-	-
12/1/2010	T-2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
12/15/2010	T-2	32	24	3	10	< 0.5	3	-	-
1/7/2011	T-2	21	5	<1.0	220	1.28	1.9	-	-
1/21/2011	T-2	49	41	5	85	0.56	3.1	-	-
2/22/2011	T-2	48	20	11	32	< 0.5	3.3	-	-
3/11/2011	T-2	<1.0	<1.0	<1.0	<1.0	< 0.5	4.5	-	-
3/24/2011	T-2	<1.0	<1.0	<1.0	<1.0	< 0.5	4.8	-	-
4/7/2011	T-2	<1.0	<1.0	<1.0	<1.0	< 0.5	4.8	-	-
4/22/2011	T-2	<1.0	<1.0	<1.0	<1.0	< 0.5	1.7	-	-
5/3/2011	T-2	<1.0	<1.0	<1.0	<1.0	< 0.5	2.6	-	-
5/19/2011	T-2	<1.0	<1.0	<1.0	2	< 0.5	2.6	-	-
6/3/2011	T-2	66	128	36	173	1.36	0.8	-	-
6/16/2011	T-2	102	141	15	413	3.34	0.6	-	-
7/1/2011	T-2	85	9	5	14	< 0.5	1.1	-	-
7/14/2011	T-2	84	5	3	8	< 0.5	0.5	-	-
7/28/2011	T-2	95	10	4	12	< 0.5	0.7	-	-
8/11/2011	T-2	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/24/2011	T-2	109	9	3	8	< 0.5	1.1	-	-
9/8/2011	T-2	81	10	4	13	< 0.5	1	-	-
9/22/2011	T-2	92	5	2	7	< 0.5	1.4	-	-
10/6/2011	T-2	56	3	1	5	< 0.5	0.9	-	-
10/20/2011	T-2	24	3	1	4	< 0.5	1.6	-	-
11/3/2011	T-2	6	<1.0	<1.0	2	< 0.5	1	-	-
11/18/2011	T-2	27	<1.0	<1.0	3	< 0.5	1.152	-	-
12/15/2011	T-2	88	5	1	6	< 0.5	1.66	-	-
1/13/2012	T-2	81	5	<1.0	<1.0	< 0.5	2.39	-	-
2/9/2012	T-2	82	4	2	6	< 0.5	3.02	4.34	8,455.79
3/14/2012	T-2	<1.0	<1.0	<1.0	<1.0	< 0.5	3.18	2.65	8,457.48
4/4/2012	T-2	55	9	12	159	< 0.5	1.81	2.91	8,457.22
4/18/2012	T-2	26	<1.0	1	12	< 0.5	1.99	3.20	8,456.93
5/3/2012	T-2	67	7	7	31	< 0.5	0.92	2.95	8,457.18
5/16/2012	T-2	116	11	6	19	< 0.5	0.11	2.85	8,457.28
6/15/2012	T-2	129	13	6	20	< 0.5	0.68	4.35	8,455.78
7/19/2012	T-2	Insufficient GW for sampling					0.33	4.42	8455.71

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WOLF CREEK SPILL SITE
US Highway 160 at MM 179.5, Colorado

Sample Date	Sample ID	Benzene ($\mu\text{g/L}$)	Toluene ($\mu\text{g/L}$)	Ethylbenzene ($\mu\text{g/L}$)	Xylenes ($\mu\text{g/L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
8/15/2012	T-2	104	15	7	25	< 0.3	0.22	5.23	8,454.90
9/19/2012	T-2	125	18	11	39	0.395	1.88	5.11	8,455.02
10/18/2012	T-2	65	9	7	23	0.18	1.77	5.05	8455.08
12/12/2012	T-2	63	10	8	28	0.10	1.84	4.25	8455.88
3/19/2013	T-2	15	2	3	9	<0.100	4.2	2.50	8457.63
4/25/2013	T-2	<1.0	<1.0	<1.0	<1.0	0.1	2.25	3.42	8456.71
5/14/2013	T-2	9.5	1.2	3.0	10.3	0.131	2.04	3.05	8457.08
6/13/2013	T-2	16.1	2.9	3.8	12.6	0.107	2.64	3.70	8456.43
7/10/2013	T-2	65.8	15.5	12.2	39.7	0.220	2.31	5.00	8455.13
8/8/2013	T-2	53.7	12.5	10.5	31.9	0.170	0.92	4.30	8455.83
11/13/2013	T-2	16.3	6	4.2	11.9	0.107	3.42	4.68	8455.45
5/15/2014	T-2	6.4	1.7	7.9	31.8	0.15	1.84	3.22	8456.91
8/6/2014	T-2	31.4	10.7	12.3	36.7	<0.100	1.92	4.60	8455.53
11/6/2014	T-2	4.1	1.3	2.5	8.4	<0.100	3.02	4.30	8455.83
2/19/2015	T-2	<1.0	<1.0	<1.0	<1.0	<0.100	8.42	2.55	8457.58
4/9/2015	T-2	<1.0	<1.0	<1.0	<1.0	<0.100	2.76	3.00	8457.13
5/21/2015	T-2	3.2	<1.0	2.8	8.7	<0.100	3.22	3.65	8456.48
8/13/2015	T-2	19.1	11.3	11.9	46.0	0.161	1.03	4.46	8455.67
11/18/2015	T-2	Frozen	Frozen	Frozen	Frozen	Frozen	Frozen	Frozen	Frozen
2/17/2016	T-2	Frozen	Frozen	Frozen	Frozen	Frozen	Frozen	Frozen	Frozen
5/4/2016	T-2	<1.0	<1.0	<1.0	<1.0	<0.100	2.17	2.40	8457.73
5/25/2016	T-2	1.21	<1.00	1.63	7.16	<0.100	2.36	2.27	8457.86
6/9/2016	T-2	1.49	<1.00	<1.00	6.86	<0.100	2.42	1.90	8458.23
6/23/2016	T-2	1.72	<1.00	<1.00	5.92	<0.100	1.87	3.48	8456.65
7/6/2016	T-2	2.95	2.47	1.15	12.3	<0.100	2.04	4.02	8456.11
7/19/2016	T-2	10.9	4.38	<1.00	41.5	0.147	1.83	4.86	8455.27
8/3/2016	T-2	13.9	4.11	<1.00	46.3	0.132	1.66	5.00	8455.13
8/22/2016	T-2	12.4	3.1	<1.0	48.0	0.119	1.73	4.90	8455.23
9/7/2016	T-2	6.5	1.2	<1.0	24.0	<0.100	2.03	4.91	8455.22
9/21/2016	T-2	11.9	2.5	<1.0	60.2	0.171	2.91	4.94	8455.19
10/5/2016	T-2	7.6	1.6	<1.0	31.2	<0.100	2.01	4.60	8455.53
10/18/2016	T-2	6.3	1.1	<1.0	28.8	0.149	1.91	4.80	8455.33
11/16/2016	T-2	3.3	<1.0	<1.0	18.6	<0.100	3.85	4.96	8455.17
4/26/2017	T-2	<1.0	<1.0	<1.0	1.2	<0.100	2.89	2.53	8457.60
8/16/2017	T-2	12.4	2.1	<1.0	55.7	0.153	1.97	4.80	8455.33
11/16/2017	T-2	1.14	<1.0	<1.0	6.92	<0.100	1.84	4.78	8455.35
5/16/2018	T-2	<1.0	<1.0	<1.0	<1.0	<0.100	1.11	3.00	8457.13
1/25/2010	T-3	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
4/20/2010	T-3	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
1/18/2010	T-5	7,440	49,700	3,470	31,900	264	-	-	-
2/3/2010	T-5	8,200	43,800	3,060	25,400	189	-	-	-
2/16/2010	T-5	4,200	23,700	1,810	110,000	189	-	-	-
2/24/2010	T-5	2,890	16,900	1,190	11,000	138	-	-	-
3/2/2010	T-5	1,780	9,820	646	5,880	46.1	-	-	-
3/16/2010	T-5	2,690	18,900	782	14,300	101	-	-	-
3/23/2010	T-5	3,690	25,800	1,260	24,200	148	-	-	-
3/29/2010	T-5	1,420	11,200	695	11,600	69.7	-	-	-
4/6/2010	T-5	1,230	12,500	944	13,100	88.4	-	-	-
4/14/2010	T-5	2,470	20,600	1,560	17,100	118	-	-	-

TABLE 1
GROUNDWATER SAMPLE RESULTS
WOLF CREEK SPILL SITE
US Highway 160 at MM 179.5, Colorado

Sample Date	Sample ID	Benzene ($\mu\text{g}/\text{L}$)	Toluene ($\mu\text{g}/\text{L}$)	Ethylbenzene ($\mu\text{g}/\text{L}$)	Xylenes ($\mu\text{g}/\text{L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
4/20/2010	T-5	541	2,440	40	1,250	88.4	-	-	-
4/28/2010	T-5	1,190	17,600	1,560	21,800	114	-	-	-
5/4/2010	T-5	860	10,900	250	12,800	70	-	-	-
5/5/2010	T-5	-	-	-	-	-	2.1	-	-
5/11/2010	T-5	737	13,300	1,050	15,500	85	3.8	-	-
5/18/2010	T-5	512	8,690	700	11,900	63.9	2	-	-
5/25/2010	T-5	309	7,370	962	13,400	74.7	2.2	-	-
6/1/2010	T-5	158	2,840	449	8,930	45.5	3.4	-	-
6/9/2010	T-5	151	2,970	563	8,580	45.8	2.5	-	-
6/15/2010	T-5	335	5,780	432	11,400	80.4	2	-	-
6/22/2010	T-5	222	3,700	<1.0	7,140	42.8	2.3	-	-
6/30/2010	T-5	252	4,080	285	9,010	51.9	-	-	-
7/6/2010	T-5	342	5,190	<1.0	7,890	44.1	2.3	-	-
7/13/2010	T-5	304	3,590	<1.0	5,590	33.2	1.9	-	-
7/27/2010	T-5	296	4,210	68	6,370	45.4	1.9	-	-
8/12/2010	T-5	184	2,500	214	5,870	59.8	2	-	-
8/25/2010	T-5	161	2,940	141	4,310	36	2.2	-	-
9/9/2010	T-5	133	1,800	308	3,240	31.1	2.2	-	-
9/23/2010	T-5	75	1,240	38	1,900	16.5	2.2	-	-
10/5/2010	T-5	151	2,330	14	3,760	19.7	2.1	-	-
10/19/2010	T-5	112	1,970	14	3,010	18.6	1.4	-	-
11/4/2010	T-5	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
11/18/2010	T-5	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
12/1/2010	T-5	70	1,030	<1.0	1,960	16.8	2.3	-	-
12/15/2010	T-5	66	1,240	50	2,140	17	1.3	-	-
1/7/2011	T-5	61	1,040	<1.0	2,010	15.8	1.4	-	-
1/21/2011	T-5	45	554	3	1,270	9.13	6.1	-	-
2/22/2011	T-5	38	499	<1.0	1,120	9	1.1	-	-
3/11/2011	T-5	66	1,190	12	2,360	15	0.9	-	-
3/24/2011	T-5	26	408	19	1,240	11	0.9	-	-
4/7/2011	T-5	13	107	<1.0	540	7	1.2	-	-
4/22/2011	T-5	13	138	5	659	9	22.6	-	-
5/3/2011	T-5	14	137	<1.0	818	8.66	3	-	-
5/19/2011	T-5	18	143	10	621	7.08	3	-	-
6/3/2011	T-5	<1	8	<1	53	1.11	1.5	-	-
6/16/2011	T-5	5	36	<1	293	5.12	0.6	-	-
7/1/2011	T-5	7	79	<1	372	4.38	1.1	-	-
7/14/2011	T-5	9	142	<1	683	5.88	2.5	-	-
7/28/2011	T-5	22	401	<1	861	7.65	0.9	-	-
8/11/2011	T-5	14	265	<1	996	6.76	2.3	-	-
8/24/2011	T-5	27	588	10	1,310	10.80	2.4	-	-
9/8/2011	T-5	<1	2	<1	30	0.93	0.1	-	-
9/22/2011	T-5	12	159	<1	645	7.27	1.6	-	-
10/6/2011	T-5	19	144	12	324	3.00	4.4	-	-
10/20/2011	T-5	2	12	<1	89	1.85	1.8	-	-
11/3/2011	T-5	4	27	<1	271	3.55	1.3	-	-
11/18/2011	T-5	4	27	<1	271	3.55	1.5	-	-
12/15/2011	T-5	6	85	<1	408	4.45	1.64	-	-
1/13/2012	T-5	7	200	4	854	10.80	1.29	4.10	8459.58

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Sample Date	Sample ID	Benzene ($\mu\text{g/L}$)	Toluene ($\mu\text{g/L}$)	Ethylbenzene ($\mu\text{g/L}$)	Xylenes ($\mu\text{g/L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
2/9/2012	T-5	4	75	<1	506	5.80	1.57	4.25	8459.43
3/13/2012	T-5	<1.0	<1.0	<1.0	<1.0	<0.5	3.98	2.84	8460.84
3/13/2012	T-5	-	-	-	-	-	1.26	2.85	8460.83
4/4/2012	T-5	9	68	74	291	3.32	-	-	-
4/18/2012	T-5	2	5	<1.0	24	0.82	1.84	3.05	8460.63
5/2/2012	T-5	2	7	<1.0	43	1.62	1.56	2.45	8461.23
5/16/2012	T-5	<1	<1	<1.0	5	<0.5	1.24	2.50	8461.18
6/15/2012	T-5	2	20	<1.0	55	2.45	1.24	3.65	8459.72
7/19/2012	T-5	2	24	65	178	2.22	1.64	4.11	8459.57
8/15/2012	T-5	2	67	101	360	4.92	0.82	4.30	8459.38
9/19/2012	T-5	-	-	-	-	-	-	4.37	8459.31
10/18/2012	T-5	-	-	-	-	-	-	4.47	8459.21
12/12/2012	T-5	<1.0	11	28	125	0.935	-	3.91	8459.77
4/25/2013	T-5	<1.0	<1.0	<1.0	<1.0	<0.100	5.55	3.22	8460.46
6/13/2013	T-5	<1.0	1.5	6.4	28.8	1.03	3.11	3.30	8460.38
8/8/2013	T-5	<1.0	5.7	10.8	34.5	1.47	2.01	3.58	8460.10
11/13/2013	T-5	1	40.4	73.9	297.0	5.77	4.08	4.30	8459.38
2/13/2014	T-5	<1.0	<1.0	<1.0	<1.0	<0.100	6.41	3.80	8459.88
5/15/2014	T-5	<1.0	<1.0	1.5	4.4	0.317	3.40	2.75	8460.93
8/6/2014	T-5	<1.0	3.4	42.7	89.4	3.23	2.69	4.14	8459.54
11/6/2014	T-5	<1.0	<1.0	1.6	3.4	0.122	5.11	4.03	8459.65
2/19/2015	T-5	<1.0	<1.0	1.2	3.1	0.248	9.07	3.85	8459.83
5/21/2015	T-5	-	-	-	-	-	6.33	2.15	8461.53
8/13/2015	T-5	-	-	-	-	-	-	4.10	8459.58
8/3/2016	T-5	Insufficient GW for sampling					4.00	4.35	8459.33
11/24/2009	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
12/4/2009	T-6	1	4	<1.0	2	<0.5	-	-	-
12/16/2009	T-6	1	3	1	8.0	<0.5	-	-	-
12/28/2009	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
1/3/2010	T-6	<1.0	<1.0	<1.0	5	<0.5	-	-	-
1/11/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
1/18/2010	T-6	<1.0	<1.0	<1.0	2	<0.5	-	-	-
1/25/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
2/3/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
2/24/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
3/2/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
3/16/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
3/23/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
3/29/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
4/6/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
4/14/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
4/20/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
4/27/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
5/4/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	-	-	-
5/5/2010	T-6	-	-	-	-	-	1.2	-	-
5/11/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	2.2	-	-
5/18/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	2.5	-	-
5/25/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	8.6	-	-
6/1/2010	T-6	<1.0	<1.0	<1.0	<1.0	<0.5	8.7	-	-

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Sample Date	Sample ID	Benzene ($\mu\text{g/L}$)	Toluene ($\mu\text{g/L}$)	Ethylbenzene ($\mu\text{g/L}$)	Xylenes ($\mu\text{g/L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
6/9/2010	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	7.2	-	-
6/15/2010	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	2.2	-	-
6/22/2010	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	1.9	-	-
6/30/2010	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	-	-	-
7/6/2010	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	0.7	-	-
7/13/2010	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	2.1	-	-
7/27/2010	T-6	<1.0	<1.0	18	<1.0	< 0.5	0.8	-	-
8/12/2010	T-6	<1.0	5	<1.0	<1.0	< 0.5	1	-	-
8/25/2010	T-6	<1.0	30	<1.0	<1.0	< 0.5	2.2	-	-
9/9/2010	T-6	<1.0	30	<1.0	<1.0	< 0.5	2	-	-
9/23/2010	T-6	<1.0	18	<1.0	<1.0	< 0.5	2	-	-
10/5/2010	T-6	<1.0	90	<1.0	<1.0	< 0.5	1	-	-
10/19/2010	T-6	<1.0	81	<1.0	<1.0	< 0.5	0.5	-	-
11/4/2010	T-6	<1.0	105	<1.0	<1.0	< 0.5	0.7	-	-
11/18/2010	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	0.6	-	-
12/1/2010	T-6	<1.0	53	<1.0	<1.0	< 0.5	2.3	-	-
12/15/2010	T-6	<1.0	115	<1.0	<1.0	< 0.5	1.6	-	-
1/7/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	5.2	-	-
1/21/2011	T-6	<1.0	23	<1.0	<1.0	< 0.5	1.7	-	-
2/4/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	6.2	-	-
2/22/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	2.4	-	-
3/11/2011	T-6	<1.0	3	<1.0	<1.0	< 0.5	5.2	-	-
3/24/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	5.4	-	-
4/7/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	5.4	-	-
4/22/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	4.7	-	-
5/3/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	1.8	-	-
5/19/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	3	-	-
6/3/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	4.2	-	-
6/16/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	0.4	-	-
7/1/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	0.7	-	-
7/14/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	1.1	-	-
7/28/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	0.7	-	-
8/11/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	2.3	-	-
8/24/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	2.3	-	-
9/8/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	0.2	-	-
9/22/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	1.6	-	-
10/6/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	0.2	-	-
10/20/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	1.6	-	-
11/3/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	1	-	-
11/18/2011	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	1.083	-	-
4/5/2012	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	-	-	-
4/18/2012	T-6	<1.0	<1.0	<1.0	<1.0	< 0.5	1.69	3.90	8460.01
7/19/2012	T-7	<1.0	<1.0	<1.0	<1.0	<0.100	3.44	4.56	8457.19
8/15/2012	T-7	<1.0	<1.0	<1.0	<1.0	<0.100	0.42	4.79	8456.96
9/19/2012	T-7	<1.0	<1.0	<1.0	<1.0	<0.100	0.75	4.87	8456.88
10/18/2012	T-7	<1.0	<1.0	<1.0	<1.0	<0.100	2.02	4.97	8456.78
12/12/2012	T-7	<1.0	<1.0	<1.0	<1.0	<0.100	5.78	3.92	8457.83
4/25/2013	T-7	<1.0	<1.0	<1.0	<1.0	<0.100	8.01	3.65	8458.10
6/13/2013	T-7	<1.0	<1.0	<1.0	<1.0	<0.100	2.95	3.64	8458.11

TABLE 1
GROUNDWATER SAMPLE RESULTS
WOLF CREEK SPILL SITE
US Highway 160 at MM 179.5, Colorado

Sample Date	Sample ID	Benzene ($\mu\text{g}/\text{L}$)	Toluene ($\mu\text{g}/\text{L}$)	Ethylbenzene ($\mu\text{g}/\text{L}$)	Xylenes ($\mu\text{g}/\text{L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
8/8/2013	T-7	<1.0	<1.0	<1.0	<1.0	<0.100	2.64	4.40	8457.35
11/13/2013	T-7	<1.0	<1.0	<1.0	<1.0	<0.100	3.68	4.92	8456.83
5/15/2014	T-7	<1.0	<1.0	<1.0	<1.0	<0.100	4.92	3.35	8458.40
8/6/2014	T-7	<1.0	<1.0	<1.0	<1.0	<0.100	3.58	4.67	8457.08
11/6/2014	T-7	<1.0	<1.0	<1.0	<1.0	<0.100	6.72	4.73	8457.02
8/13/2015	T-7	-	-	-	-	-	-	4.45	8457.30
11/18/2015	T-7	-	-	-	-	-	-	-	-
5/18/2010	T-8	177	2,800	140	5,030	26.6	1.5	-	-
5/25/2010	T-8	157	2,920	126	4,990	27.9	3.6	-	-
6/1/2010	T-8	59	1,360	50	2,900	14.9	1.8	-	-
6/9/2010	T-8	62	1,770	144	4,510	23.3	2.4	-	-
6/15/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
6/22/2010	T-8	<1.0	17	<1.0	470	7.99	DRY	DRY	DRY
6/30/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
7/6/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
7/13/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
7/27/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/12/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/12/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/25/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
9/9/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
9/23/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
10/5/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
10/19/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
11/4/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
11/18/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
12/1/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
12/15/2010	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
1/7/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
1/21/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
2/4/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
2/22/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
3/11/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
3/24/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
4/7/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
4/22/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
5/3/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
5/19/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
6/3/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
6/16/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
7/1/2011	T-8	<1	1	<1	76	1.25	2.9	-	-
7/14/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
7/28/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/11/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/24/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
9/8/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
9/22/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
10/6/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
10/20/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY

TABLE 1
GROUNDWATER SAMPLE RESULTS
WOLF CREEK SPILL SITE
US Highway 160 at MM 179.5, Colorado

Sample Date	Sample ID	Benzene ($\mu\text{g}/\text{L}$)	Toluene ($\mu\text{g}/\text{L}$)	Ethylbenzene ($\mu\text{g}/\text{L}$)	Xylenes ($\mu\text{g}/\text{L}$)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
11/3/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
11/18/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
12/15/2011	T-8	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
4/4/2012	T-8	<1.0	2	<1.0	2	<0.5	6.7	3.43	8,460.55
5/18/2010	T-9	223	903	8	379	3.28	1.7	-	-
5/25/2010	T-9	86	222	4	273	1.47	1.4	-	-
6/1/2010	T-9	149	232	13	474	2.2	1.6	-	-
6/9/2010	T-9	156	327	36	822	3.5	6.1	-	-
6/15/2010	T-9	175	97	47	841	5.03	-	-	-
6/22/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
6/30/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
7/6/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
7/13/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
7/27/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/12/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/25/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
9/9/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
9/23/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
10/5/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
10/19/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
11/4/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
11/18/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
12/1/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
12/15/2010	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
1/7/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
1/21/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
2/4/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
2/22/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
3/11/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
3/24/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
4/7/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
4/22/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
5/3/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
5/19/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
6/3/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
6/16/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
7/1/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
7/14/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
7/28/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/11/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/24/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
9/8/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
9/22/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
10/6/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
10/20/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
11/3/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
11/18/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
12/15/2011	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
8/8/2013	T-9	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY

TABLE 1
GROUNDWATER SAMPLE RESULTS
WOLF CREEK SPILL SITE
US Highway 160 at MM 179.5, Colorado

Sample Date	Sample ID	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	TVPH (mg/L)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Water Table Elevation (ft)
4/9/2015	T-9	<1.0	<1.0	<1.0	<1.0	<0.100	8.72	3.75	-
CDPHE Groundwater Standards	5 2.2 Wetlands	700	560	1,400	-	-	-	-	-

Notes:

1. Colorado groundwater standards as published in the Basic Standards for Groundwater, Regulation 41, by the Colorado Department of Public Health and Environment (CDPHE), Water Quality Control Commission.
2. **Bold** Indicates an exceedance of CDPHE groundwater standards.

TVPH total volatile petroleum hydrocarbons

µg/L micrograms per liter

mg/L milligrams per liter

September 05, 2019

Apex Companies, LLC
Melanie McAllister
4150 Darley Avenue, Suite 1
Boulder CO 80305

Project Name - JC Hunt Wolf Creek

Project Number - 4910

Attached are your analytical results for JC Hunt Wolf Creek received by Origins Laboratory, Inc. September 04, 2019. This project is associated with Origins project number Y909034-01.

The analytical results in the following report were analyzed under the guidelines of EPA Methods. These methods are identified as follows; "SW" are defined in SW-846, "EPA" are defined in 40CFR part 136 and "SM" are defined in the most current revision of Standard Methods For the Examination of Water and Wastewater.

The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody. As such, this report shall not be reproduced except in full, without the written approval of Origin's laboratory.

Unless otherwise noted, the analytical results for all soil samples are reported on a wet weight basis. All analytical analyses were performed under NELAP guidelines unless noted by a data qualifier.

Any holding time exceedances, deviations from the method specifications or deviations from Origins Laboratory's Standard Operating Procedures are outlined in the case narrative.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all.

Origins Laboratory, Inc.
303.433.1322
o-squad@oelabinc.com



Apex Companies, LLC

4150 Darley Avenue, Suite 1

Boulder CO 80305

Melanie McAllister

Project Number: 4910

Project: JC Hunt Wolf Creek

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-01	Y909034-01	Water	August 28, 2019 11:20	09/04/2019 09:50

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

ORIGINS LABORATORY, INC.

Apex Companies, LLC
4150 Darley Avenue, Suite 1
Boulder CO 80305

Melanie McAllister
Project Number: 4910
Project: JC Hunt Wolf Creek

Client: Apex Companies
Address: 4150 Derby Ave, Ste 1
Boulder
Telephone Number: _____
Email Address: melanie.orecchia@apexc.com

Temp Received- 3.2 Date Results Needed

Origins Laboratory, Inc.

Jeff Pellegrin

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ORIGINS

LABORATORY, INC

Apex Companies, LLC
4150 Darley Avenue, Suite 1
Boulder CO 80305

Melanie McAllister
Project Number: 4910
Project: JC Hunt Wolf Creek

Origins Laboratory

F-012207-01-R1
Effective Date: 01/09/12

Sample Receipt Checklist				
Origins Work Order:	4909034			
Checklist Completed by:	Dan Lee			
Date/time completed:	9-4-19			
Matrix(s) Received: (Check all that apply):	Soil/Solid	Water	Other:	(Describe)
Cooler Number/Temperature:	1 / 3.2 °C	/	/ °C	/ °C
Thermometer ID:	T003			
Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C ⁽¹⁾ ?	/			
Is there ice present (document if blue ice is used)?	/			
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)		/		
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)		/		
Were all samples received intact ⁽¹⁾ ?	/			
Was adequate sample volume provided ⁽¹⁾ ?	/			
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?		/		
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	/			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	/			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	/			
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	/			
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.		/		
Are samples preserved that require preservation and was it checked ⁽¹⁾ ? (note ID of confirmation instrument used in comments) / (preservation is not confirmed for subcontracted analyses in order to insure sample integrity)/(pH < 2 for samples preserved with HNO3, HCl, H2SO4) / (pH > 10 for samples preserved with NaAsO2+NaOH, ZnAc+NaOH)			/	
Additional Comments (if any):				

⁽¹⁾If NO, then contact the client before proceeding with analysis and note date/time and person contacted as well as the corrective action to in the additional comments (above) and the case narrative.

Reviewed by (Project Manager) 

9/5/19
Date/Time Reviewed

Origins Laboratory, Inc.



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ORIGINS

LABORATORY, INC

Apex Companies, LLC
4150 Darley Avenue, Suite 1
Boulder CO 80305

Melanie McAllister
Project Number: 4910
Project: JC Hunt Wolf Creek

MW-01

8/28/2019 11:20:00AM

Analyte	Result	Limit	Units	Dilution	Batch	Reporting	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y909034-01 (Water)

BTEX/TVPH by EPA 8260D

Benzene	0.0766	0.00100	mg/L	1	B9I0409	KDK	09/04/2019	09/05/2019		
Toluene	0.00134	0.00100	"	"	"	KDK	"	"		
Ethylbenzene	0.00526	0.00100	"	"	"	KDK	"	"		
Xylenes, total	ND	0.00100	"	"	"	KDK	"	"		U
Gasoline Range Hydrocarbons	0.702	0.100	"	"	"	KDK	"	"		
Surrogate: 1,2-Dichloroethane-d4	75.2 %		70-130			"	"	"		
Surrogate: Toluene-d8	83.2 %		70-130			"	"	"		
Surrogate: 4-Bromofluorobenzene	83.8 %		70-130			"	"	"		

Origins Laboratory, Inc.

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Apex Companies, LLC
4150 Darley Avenue, Suite 1
Boulder CO 80305

Melanie McAllister
Project Number: 4910
Project: JC Hunt Wolf Creek

Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9I0409 - EPA 5030B (Water)

Blank (B9I0409-BLK1)							Prepared: 09/04/2019 Analyzed: 09/04/2019			
Benzene	ND	0.00100	mg/L							U
Toluene	ND	0.00100	"							U
Ethylbenzene	ND	0.00100	"							U
Xylenes, total	ND	0.00100	"							U
Gasoline Range Hydrocarbons	ND	0.100	"							U
Surrogate: 1,2-Dichloroethane-d4	0.046		"	0.0625		74.1	70-130			
Surrogate: Toluene-d8	0.059		"	0.0625		95.1	70-130			
Surrogate: 4-Bromofluorobenzene	0.053		"	0.0625		84.8	70-130			

Origins Laboratory, Inc.

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Boulder CO 80305

Melanie McAllister
Project Number: 4910
Project: JC Hunt Wolf Creek

Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B9I0409 - EPA 5030B (Water)										
LCS (B9I0409-BS1)										
Prepared: 09/04/2019 Analyzed: 09/04/2019										
Benzene	0.0521	0.00100	mg/L	0.0500	104	70-130				
Toluene	0.0569	0.00100	"	0.0500	114	70-130				
Ethylbenzene	0.0480	0.00100	"	0.0500	96.1	70-130				
m,p-Xylene	0.0951	0.00200	"	0.100	95.1	70-130				
o-Xylene	0.0472	0.00100	"	0.0500	94.4	70-130				
Surrogate: 1,2-Dichloroethane-d4	0.045		"	0.0625	72.0	70-130				
Surrogate: Toluene-d8	0.061		"	0.0625	97.4	70-130				
Surrogate: 4-Bromofluorobenzene	0.055		"	0.0625	87.8	70-130				

Origins Laboratory, Inc.

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4150 Darley Avenue, Suite 1
Boulder CO 80305

Melanie McAllister
Project Number: 4910
Project: JC Hunt Wolf Creek

Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9I0409 - EPA 5030B (Water)

Matrix Spike (B9I0409-MS1)		Source: Y909033-01			Prepared: 09/04/2019 Analyzed: 09/04/2019				
Benzene	0.0490	0.00100	mg/L	0.0500	ND	97.9	70-130		
Toluene	0.0525	0.00100	"	0.0500	ND	105	70-130		
Ethylbenzene	0.0466	0.00100	"	0.0500	ND	93.2	70-130		
m,p-Xylene	0.0901	0.00200	"	0.100	0.000150	89.9	70-130		
o-Xylene	0.0441	0.00100	"	0.0500	ND	88.3	70-130		
Surrogate: 1,2-Dichloroethane-d4	0.044		"	0.0625		69.7	70-130		S-04
Surrogate: Toluene-d8	0.059		"	0.0625		94.4	70-130		
Surrogate: 4-Bromofluorobenzene	0.054		"	0.0625		87.2	70-130		

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Project: JC Hunt Wolf Creek

Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B9I0409 - EPA 5030B (Water)										
Matrix Spike Dup (B9I0409-MSD1)										
Source: Y909033-01 Prepared: 09/04/2019 Analyzed: 09/04/2019										
Benzene	0.0516	0.00100	mg/L	0.0500	ND	103	70-130	5.15	20	
Toluene	0.0555	0.00100	"	0.0500	ND	111	70-130	5.50	20	
Ethylbenzene	0.0479	0.00100	"	0.0500	ND	95.7	70-130	2.65	20	
m,p-Xylene	0.0916	0.00200	"	0.100	0.000150	91.5	70-130	1.68	20	
o-Xylene	0.0446	0.00100	"	0.0500	ND	89.3	70-130	1.13	20	
Surrogate: 1,2-Dichloroethane-d4	0.044		"	0.0625		71.2	70-130			
Surrogate: Toluene-d8	0.060		"	0.0625		96.2	70-130			
Surrogate: 4-Bromofluorobenzene	0.055		"	0.0625		87.3	70-130			

Origins Laboratory, Inc.

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Melanie McAllister
Project Number: 4910
Project: JC Hunt Wolf Creek

Notes and Definitions

U Sample is Non-Detect.

S-04 The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

All soil results are reported at a wet weight basis.

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.